School Lunch Management

in relation to nutritive value, cost, and acceptance of foods served

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Prepared by

MARGARET B. DREISBACH AND ELIZABETH HANDY

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SCHOOL LUNCH MANAGEMENT IN RELATION TO NUTRITIVE VALUE, COST, AND ACCEPTANCE OF FOODS SERVED[1]

SUMMARY

Findings in 39 studies of school lunch management made throughout the country from 1946 to 1948 are reported in this publication. The schools included in the studies were selected by the agencies sponsoring the school lunch program within the State. Detailed information was collected on food served on 1 day; labor used for supervision, food preparation, serving, and cleaning; space and equipment used for school lunch purposes; and receipts and costs on 1 day and for a longer period.

Results showed that the lunches frequently were deficient in several nutrients when calculated values were compared with one-third of the allowances recommended by the National Research Council for children 10 to 12 years of age. Riboflavin was the only nutrient in which all lunches were completely adequate.

Although the lunches were planned to conform to the Type A pattern set up by the U. S. Department of Agriculture, a number fell below the requirements, especially for protein-rich food and butter or margarine. The reason usually was that servings were not uniform for all children or of the size planned.

Some pupils refused to accept all of the food offered in the Type A lunch and some left edible food on their plates. The quantity of plate waste varied from school to school but was highest for vegetables and vegetable salads and main dishes. It was lowest for fruits and "made" desserts and breads.

More than half of the schools used foods donated by the U. S. Department of Agriculture, although some of the studies were made during months when the distribution of commodities was very light.

Pupil participation ranged from 21 percent of the enrolled pupils in one school to 100 percent in another. The price of the lunch tended to influence participation. The percentage of enrolled pupils receiving free lunches was very small, and would have been lower if pupils working for their lunches had not been erroneously considered in the free-lunch group by some schools.

The number of paid adult workers in the different schools ranged from one to six. Some schools used part-time pupil and volunteer workers in addition to those employed on a full-time basis. The proportion of workers to the number of lunches served varied considerably from school to school. In four schools using only paid adult workers, the number of lunches per worker ranged from 57 to 110 and averaged 73.

The workers' rate of production ranged from 6 to 16 lunches per man-hour. Time expended by workers on all jobs ranged from 4 to 11 minutes per lunch and averaged 7 minutes. Some lunches required little preparation by workers because canned goods, mixes, and ready-to-eat foods were used extensively. Most of the schools spent more time in serving and cleaning than in preparing food.

Time was lost in lunchrooms where workers had long indirect routes to travel in preparing and serving lunches. Basic food preparation routes (the measured distance starting at the storeroom, passing the preparation centers, and ending at the serving counter) ranged from 26 to 107 feet and averaged 58 feet. A few schools having large kitchens had kept the food route short and direct,

[1] This study was conducted in part with funds made available by the Production and Marketing Administration. Cooperation of State departments of education, State departments of public health and welfare, school personnel, and others also greatly facilitated the study.

with no crossing or backtracking, by grouping kitchen equipment near the storeroom and the serving counter.

Some lunchrooms were well equipped; others served a large number of lunches with little or no power equipment. However, the school showing the highest record of production by serving 16 lunches per man-hour had all desirable pieces of power and other equipment; no volunteer or pupil labor was used. Usually space limitations in dining areas were met by dividing the pupils into groups that could be served at one time.

Records of daily receipts and expenditures showed that the average cash received per lunch (including reimbursement for pupil lunches under the National School Lunch Act) was 24 cents. The average food cost was 17 cents and the average labor cost (including food cost of workers' lunches), 6 cents, making a total of 23 cents per lunch. Expenditures for food would have been somewhat higher in 22 of the schools if Government donated foods had not been used. The receipts and costs varied for individual schools; however, any gain or deficit for 1 day tended to narrow or disappear over a longer period of time.

Food, labor, maintenance of equipment, and miscellaneous expenses including laundry were the only items of cost to the lunchrooms. In most of the schools space, fuel, lights, and water were furnished by the school board.

Analysis of the findings from this study indicates relationships between management practices, and the nutritive value, cost, and acceptance of the lunches. Techniques developed in making the studies suggest a method by which school administrators, lunchroom managers, and others concerned with school lunch operations can evaluate their school lunch programs.

PURPOSE OF THE STUDIES

Returns from the school lunch program are measured in terms of satisfaction and well-being of school children. To yield these returns in the greatest degree, the lunches need to be palatable and satisfying, have high nutritive value, and be so priced that pupils can afford to buy them. In some schools, this means keeping the price of the lunch within reach of children from low-income families and also providing free lunches for needy children. Skilled, efficient management is required to serve lunches that meet these specifications.

The purpose of school lunch management studies reported here was threefold: (1) To observe and evaluate management methods in selected school lunch programs; (2) to relate management practices to the nutritive value, cost, and acceptance of lunches served; and (3) to develop a suitable technique by which school lunch supervisors and others can make management appraisals of local school lunch programs. It is hoped that these studies will focus attention on the importance of good management in achieving the goals of the school lunch programs.

Information from these studies has been applied in the preparation of materials pertaining to school lunch facilities and management for the use of school lunch supervisors, managers, and others (*3*, *7*, *9*, *10*, *11*).[2]

MAKING THE STUDIES

Selection of schools

Thirty-nine schools were selected by agencies sponsoring school lunch programs in 16 States (as shown on the map in Appendix B, p. 34). To locate comparable school lunch programs of different sizes, the agencies were requested to use the following criteria:

(1) School located in a rural community or town under 2,500 population, preferably with school bus service.

(2) Noon lunches conforming to the Type A pattern specified by the United States Department of Agriculture as the basis for reimbursement (*14*).[2]

(3) Number of lunches served falling within

[2] Italic numbers in parentheses refer to Literature Cited, p. 21.

one of the following ranges: 75 to 150, 150 to 250, 250 to 350, 350 to 500.

(4) A high proportion of the pupils enrolled eating the planned meal served by the school.

(5) Operations on a satisfactory financial basis, that is, nonprofit yet meeting expenses as shown by records.

(6) Adequate space and equipment for school lunch purposes.

Collection of data

Nine of the studies were made in 1946 (*3*) and the rest in the 1947–1948 school year. A visit was made to each school and the major portion of the information was collected through direct observation. It was necessary, however, to obtain some facts through interview and by reference to records on hand. The schedule used for recording information covered such items as foods served on 1 day, labor requirements for the same day, the lay-out of space and equipment, and financial aspects of school lunch operations (see Appendix C, p. 35 for schedule).

The food section of the schedule included the menu with the size of servings for primary and upper grades, the quantity and unit cost of food ingredients used in each dish, the number of lunches served to paying and nonpaying pupils and adults, the number of pupils served per minute at the peak of service, the number bringing home-packed lunches, the number leaving each kind of food on their plates, and the total weight of each food wasted.

Information on labor included the number of paid adult workers, the hours worked, wages paid, job description, training, and experience for each worker, and the hours worked by paid pupils and volunteer workers. In all except the first nine schools the "flow of work" was recorded by clocking the time expended by each worker on food preparation, serving, cleaning, and other activities throughout the day.

A sketch of the floor plan was drawn approximately to scale to show the size of kitchen, dining area, and storeroom, and the dimensions and location of the major equipment. The principal routes traveled by the workers in preparing the lunch were drawn on the floor sketch.

Food costs were obtained from delivery slips and the lunchroom manager's records. Salaries and other costs were furnished by the school principal or lunchroom manager. The financial record for 3 months or a longer period was obtained from records on file in the school except in those cases where it was more convenient to obtain this record in the office of the State sponsoring agency. These data, except for the meals served to adults, were usually available for the previous year.

In selecting the schools, the agencies could not always find schools that met all of the criteria suggested. Thirty-three schools served Type A lunches only; the other six offered some foods for self-selection in addition to the Type A.

Data from 26 studies made during the second school year were more comprehensive than from 9 studies made the first year. In one school the study was repeated the second year. One study was made in a school without a kitchen where food was transported from another lunchroom.

RESULTS

Results of the study are presented in tables 1 to 5 and figures 1 to 4. For purposes of comparison, schools are listed in the tables according to the number of lunches served on the day of the study, from the lowest to the highest.

Nutritive value of the lunches

The nutritive value of each food served in the lunches was calculated for food energy and eight nutrients: Protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid. In making these calculations, values from Tables of Food Composition in Terms of Eleven Nutrients, Miscellaneous Publication 572 (*8*) and other Bureau sources were used. The total for each nutrient in the quantities of foods prepared was computed and divided by the number of meals served to give the nutrients per serving. These values were used to figure the nutritive value of the individual lunches.

One-third of the daily allowance for the various nutrients recommended by the National Research Council (4) for 10- to 12-year-old children was used as a standard in evaluating the nutritional adequacy of the lunches (Appendix table 5). Comparison of the calculated values with the recommended allowances showed riboflavin to be the only nutrient in which all lunches were completely adequate. Riboflavin value was satisfactory because of the one-half pint of milk required for a Type A lunch. Lunches including a serving of a dark green leafy vegetable or a deep yellow vegetable were more than adequate in respect to vitamin A and those including citrus juice were high in ascorbic acid.

The calculated values for thiamine and ascorbic acid were undoubtedly higher than in the lunches actually eaten. The values used for calculating these two nutrients as given in food composition tables were based on raw, canned, and dried foods with no allowance for losses during cooking and holding periods.

A few schools offered second servings of the main dish, salad, bread, or any food left after serving, while others allowed seconds on bread only. In some schools a few pupils bought a second bottle of milk. Although these extras increased the nutritive values for the pupils who requested them, they were not calculated as no records of second servings were made.

Some lunches were lower in nutritive value than the calculations indicate because the pupils failed to accept all of the food offered in the Type A lunch or because they left edible food on their plates.

Plate waste and refusal of food

Plate waste and refusal of food reduced nutritional benefits of the lunches and represented monetary loss to the child. The pupils who left food on their plates and those who refused to take milk and other foods included in the price of the Type A lunch, paid for food which they did not eat. Foods wasted also required time of school lunch workers in preparation and serving.

From a total of 8,571 lunches served in the 33 schools serving only Type A lunches the plate waste totaled 494 pounds of edible food as follows:

	Quantity (pounds)
Plate waste from—	
Vegetables and salads	180
Main dishes	145
Milk	82
Desserts, including fruit	46
Bread	41

The quantity of plate waste per 100 lunches served was calculated in order to compare plate waste from school to school. In the 33 schools, plate waste ranged from 5 ounces to 20 pounds per 100 lunches and averaged 6 pounds.

Using caloric values as a measure of size, the possible relationship between quantity of plate waste and size of lunch was considered (fig. 1). In a group of 26 schools serving only the Type A lunch (studied during the same school year), the two lunches that provided the highest number of calories had the highest plate waste per 100 lunches. Of 7 other "large" lunches (providing over one-third of the recommended daily allowance for calories), 2 had above average and 5 had below average plate waste. Of 17 "small" lunches (providing less than one-third of the recommended daily allowance for calories), 7 had average or above average plate waste and 10 had below average plate waste. It would appear, therefore, that high caloric value is not always a cause of plate waste.

The amount of plate waste was also considered in relation to the length of time spent by the workers on food preparation (fig. 1). In 11 of the 26 schools where workers spent average or more than average time (average 3 hours) in food preparation per 100 lunches, there was less than average plate waste per 100. Only 3 schools that spent average or more time on food preparation had higher than average plate waste. Of the remaining 12 schools that spent less than average time in food preparation, 8 had average or higher than average plate waste per 100 and only 4 had less than average plate waste. These results indicate that there may be a direct relationship between time spent in food preparation and acceptability of the food served.

The relative popularity of the foods served in these lunches is indicated by the percentages of pupils leaving the foods (Appendix table 5). In the majority of the schools, milk, fruits, "made" desserts, and bread were less frequently wasted than vegetables, including vegetable salads, and main dishes. The percentages leaving vegetables

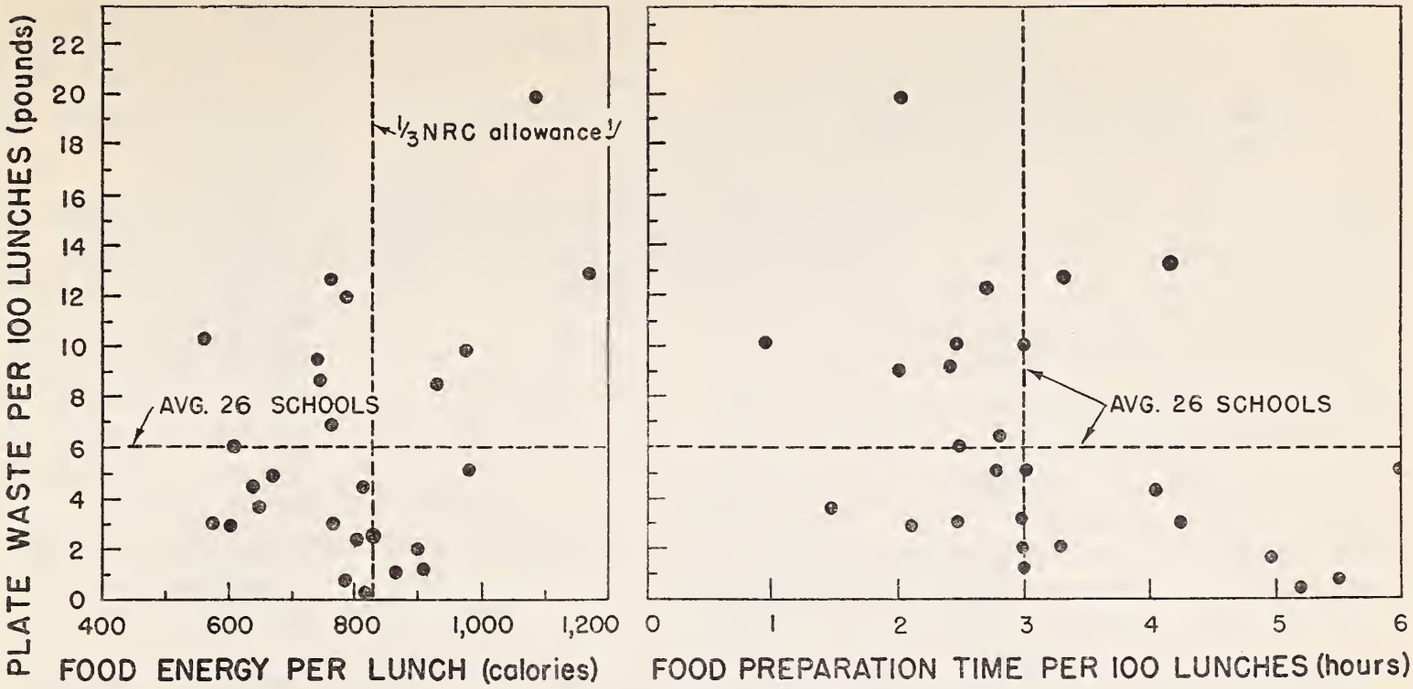

FIGURE 1.—Plate waste related to size of lunch (calories) and to time spent in food preparation per 100 lunches in 26 schools.

[1] One-third of National Research Council's recommended daily allowances for children 10 to 12 years old.

and vegetable salads was rather high, and children left some of the main dish more frequently than any other food except vegetables. To illustrate, in one school, four times as many pupils left creamed chicken on mashed potatoes as left apple and pineapple salad, and over three and one-half times as many left creamed chicken as left the cherry cobbler. Comparisons of the percentages of pupils leaving certain foods also indicated that food preferences differed from school to school. In three schools, for instance, the percentages leaving creamed chicken were 3, 12, and 21 percent. In four schools, the percentages leaving candied sweetpotatoes showed even greater differences—3, 12, 33, and 56 percent.

When the same food was prepared by different methods, percentages of pupils leaving it varied. For example, in three schools serving buttered beets, 5, 15, and 27 percent of the pupils left some of the serving while in two other schools where pickled beets were served none was left.

The reasons children left food appeared to differ from school to school. It may be assumed that plate waste and refusals resulted from dislike of certain foods, other dissatisfaction with the lunch, or indifference to food due to lack of appetite. Some pupils hurried through the lunch to take part in other activities. Leaving certain foods seemed to be habitual in some cases as managers or cooks occasionally predicted waste of some food which the children "did not like." Frequently principals commented that food and nutrition teaching tended to reduce plate waste.

The lunches in relation to Type A requirements

All of the schools serving reimbursed lunches intended to meet the Type A requirements (*14*). However, when the quantities of food actually used in preparing the lunches were divided by the number served, the averages did not always equal the quantities specified in the Type A pattern. Among the 26 schools, the numbers that met, exceeded, or fell below the Type A requirements are shown below:

	Number of schools—		
	Meeting	*Exceeding*	*Falling below*
Type A requirements:			
Protein-rich food (2 ounces or equivalent)	4	9	13
Vegetables or fruits or both (¾ cup)	11	11	4
Bread (1 or more portions)	16	10	0
Butter or fortified margarine (2 teaspoons)	9	2	15
Whole milk (½ pint)	24	0	2

Protein-rich food and butter or fortified margarine were the foods for which the requirements were least often met. Thirteen schools out of 26 fell below the protein-rich food requirement. If

more than one kind of protein-rich food was used in a lunch there seemed to be difficulty in figuring the amount of each kind needed to make the total. For example, when less than 2 ounces of lean meat was used in the main dish, and cheese, egg, beans, or peanut butter were used to complete the requirement, the quantity of meat usually was calculated correctly, but there was difficulty in figuring the quantity of the other foods needed to provide the total. In some cases, the quantity of cooked beans did not fulfill the requirement because the yield of cooked from dry beans had not been estimated correctly.

Of the 26 schools, 15 failed to provide the required amount of table fat. Even when sufficient quantity was provided, children would not always accept it. Various practices for serving it were followed. Several schools used the required quantity for cooking and served bread or corn bread without butter or margarine; some added it to sandwich filling; some served the bread already spread with butter or margarine and a few schools served it separately.

Many of the schools in which the lunches failed to meet Type A requirements had not prepared sufficient quantities of food to provide adequate servings for the number of persons served (*7*). The number eating in the lunchroom varied from day to day and in some instances more pupils ate on the day of the study than had been expected. Another reason some of the lunches fell short was lack of serving equipment to provide uniform portions (*10*).

All schools served whole milk as a beverage, but in two the milk was poured into glasses that did not hold ½ pint.

Foods used

The foods used in Type A lunches in 26 schools were classified according to the "Basic 7" food groups (*6*) and the number of lunches in which each food was used in any way are shown below and in figure 2.

Group 1. Leafy, green, and yellow vegetables	Number of lunches including: Carrots, 12; peas, 7; green beans, 6; lettuce, 5; sweetpotatoes, 5; spinach, 3; green peppers, 1; turnip greens, 1; pumpkin, 1.
Group 2. Citrus fruit, tomatoes, raw cabbage	Number of lunches including: Orange juice, 4; orange - grapefruit juice, 1; tomatoes, 12; cabbage, 10.
Group 3. Potatoes, other vegetables, other fruits	Number of lunches including: Potatoes, 10; onions, 12; beets, 6; celery, 6; corn, 4; cucumbers, 2; apples, 12; pineapple, 5; bananas, 2; cherries, 2; peaches, 2; plums, 2; raisins, 2; mixed fruits, 2; apricots, 1; figs, 1; grapes, 1; prunes, 1; strawberries, 1.
Group 4. Milk, cheese, ice cream	Number of lunches including: Fluid whole milk, 26; evaporated milk, 9; nonfat dry milk, 3; buttermilk, 2; whipping cream, 2; cheese, 6; ice cream, 1.
Group 5. Meat, poultry, fish, eggs, dry beans and peas, nuts	Number of lunches including: Ground beef, 6; stew beef, 3; ham, 2; ground beef and pork, 1; sausage, 1; frankfurters, 1; chicken, 4; tuna fish, 1; fresh eggs, 9; dried whole eggs, 2; dry beans, 4; dry black-eyed peas, 1; nuts, 1; peanut butter, 1.
Group 6. Bread, flour, cereals	Number of lunches including: Enriched white bread, 17; whole-wheat bread, 7; "home-made" yeast bread, 3; white rolls, 3; raisin bread, 1; rye bread, 1; french bread, 1; corn bread, 1; corn muffins, 1.
Group 7. Butter, fortified margarine	Number of lunches including: Butter, 6; butter and margarine, 3; margarine, 17.

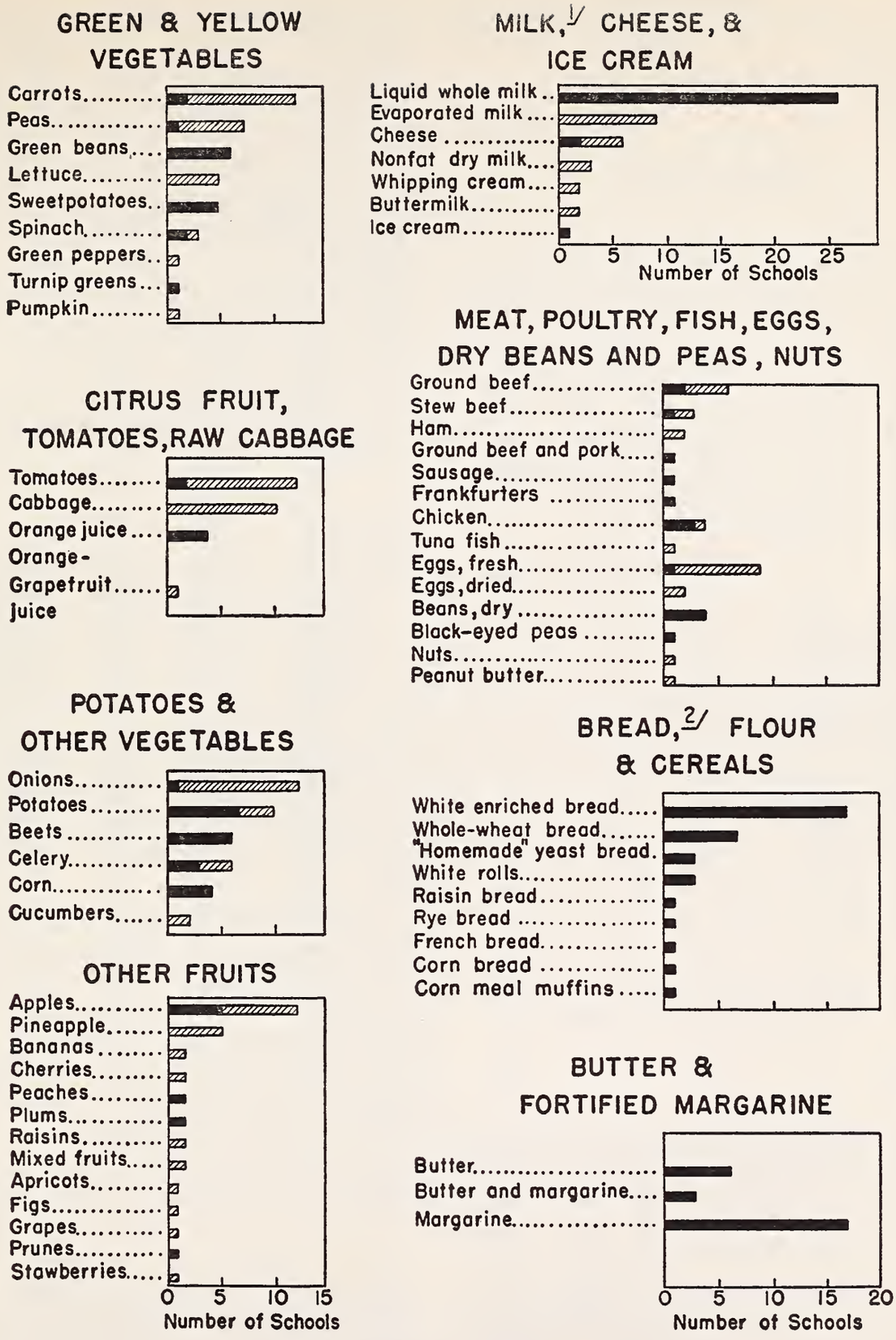

FIGURE 2.—Foods used in lunches in 26 schools.

[1] Half pints served as a beverage; additional milk used for cooking.
[2] Some schools used more than one kind of bread.

Raw and canned fruits and vegetables were purchased more often than dried and frozen as shown below:

	Number of schools using— Fruits	Vegetables
Raw	11	25
Canned	15	21
Frozen	0	3
Dried	3	8

Donated foods. Information was obtained concerning use of foods donated by the U. S. Department of Agriculture[3] and by local groups. Most of the studies were made early in the school year during a period when distribution of Government donated foods was light. Some of the schools had on hand donated foods that were not used on the day of the study. On the day studied Government donated foods were used by 22 of the 39 schools as follows:

Foods:	Number of schools using
Potatoes	9
Orange juice, canned	6
Dried whole eggs	3
Sweetpotatoes	3
Pineapple, canned	3
Nonfat dry milk	2
Green beans, canned	2
Tomato flakes	2
Figs, canned	2
Grapefruit juice, canned	2
Sliced peaches, canned	2
Tomato juice, canned	1
Tomatoes, canned	1
Apricots, canned	1
Peach jam	1
Apples, fresh	1
Tomato paste	1
Cheese	1

Foods donated by local groups were also used in four schools on the day of the study.

Participation

Participation refers to pupils and adults taking part in the lunch program by eating the school lunch. Both paying pupils and those eating "free" lunches were included but those eating home-packed lunches were not counted as participants. The adults eating the school lunch were school principals, teachers, visitors, and school lunch workers. The number of lunches served to pupils on 1 day and the enrollment of the school were used in calculating the percentage of pupils participating (table 1).

[3] Foods purchased under Section 6 of the National School Lunch Act and those purchased under the program to remove surplus agricultural commodities. See The Direct Distribution of Food (*13*) for description of the distribution programs.

In the 39 studies, pupil participation ranged from 21 to 100 percent and averaged 63 percent. Whether or not the pupils participated in the lunch program depended on various factors. Some pupils lived within walking distance of their homes and could go home for lunch.

The selling price of the lunch seemed to have some influence on the percentage of pupils participating. In 32 of the 33 schools serving only Type A lunches, the average selling price was 18 cents (table 4), and the average percentage of pupils participating was 64 percent.

The figures below show the selling price of the Type A lunch in relation to participation for the 32 schools:

Price of lunch	Number of schools	Percent participation
$0.10	3	82 to 87 (avg. 85)
.15	7	29 to 87 (avg. 60)
.16	1	65
.17	1	100
.20	15	24 to 98 (avg. 65)
.21	1	45
.25	4	21 to 75 (avg. 42)

The school having 100 percent participation was located in a community which had supported the school lunch program intensively for some years and in which a well-organized nutrition program had been carried on with the pupils and their parents.

Of 8,571 lunches in the 33 schools serving only Type A lunches, 370 "free" lunches (4 percent of the total) were served. However, some schools erroneously reported as "free" the lunches for which the pupils worked. The number served free was not considered as a factor affecting percentage participating since relatively few pupils were certified to receive free meals.

Proportion of workers to lunches served

In the literature on the operation of school lunch programs there is no general agreement with respect to the number of workers needed in relation to the number of lunches served. It has been suggested by one State (*5*) that when workers are employed 30 hours a week, one worker can prepare and serve a complete meal for 50 children, two workers for 150 children, three workers for 300 children, and one additional worker for each 100 additional children. A work-

TABLE 1.—*Pupil and adult participation in lunches, 39 schools*

School No.	Lunches served	Pupil participation					Adult participation			Pupils bringing home-packed lunches	
		Total enrolled pupils participating[1]		Pupils eating—			Total	Teachers eating	Workers and others eating	Total	Buying milk in lunchroom
				Type A lunch	Type A lunch except milk[2]	Other foods					
	No.	*Pct.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No*	*No.*	*No.*	*No.*
1	77	98	68	67	1	0	9	6	3	0	0
2	104	68	94	70	24	0	10	5	5	4	0
3	114	54	102	102	0	0	12	8	4	65	22
4	119	67	108	108	0	0	11	7	4	8	0
5	138	75	124	124	0	0	14	9	5	18	16
6	165	32	143	143	0	0	22	19	3	54	6
7	173	21	147	128	19	0	26	20	6	0	0
8	173	[3]26	156	144	12	0	17	11	6	0	0
9	175	64	159	159	0	0	16	8	8	24	0
10	176	24	152	147	5	0	24	12	12	77	0
11	183	87	156	156	0	0	27	10	17	12	1
12	184	92	165	165	0	0	19	6	13	11	0
13	185	58	185	66	4	115					
14	198	42	178	157	21	0	20	15	5	30	0
15	204	29	177	177	0	0	27	18	9	102	54
16	205	65	192	192	0	0	13	9	4	11	0
17	210	46	189	189	0	0	21	10	11	5	3
18	211	70	193	193	0	0	18	11	7	37	0
19	245	77	245	227	0	18					
20	254	40	221	70	151	0	33	21	12	182	10
21	304	75	304	294	10	0					
22	309	59	286	286	0	0	23	7	16	9	5
23	316	71	289	289	0	0	27	14	13	6	5
24	320	89	293	100	193	0	27	15	12	0	0
25	326	45	290	290	0	0	36	23	13	41	15
26	328	50	302	301	1	0	26	15	11	71	29
27	342	46	321	277	44	0	21	15	6	3	0
28	352	68	323	323	0	0	29	14	15	8	6
29	355	82	355	199	156	0					
30	355	87	355	355	0	0					
31	390	51	390	365	25	0					
32	423	100	396	396	0	0	27	18	9	1	1
33	442	87	423	373	50	0	19	14	5		
34	450	86	418	389	29	0	32	24	8	0	0
35	487	58	487	[4]71	0	416					
36	496	70	461	381	80	0	35	27	8	6	0
37	525	94	525	176	0	349					
38	568	58	521	204	14	303	47	36	11	89	29
39	810	56	766	257	243	266	44	37	7	515	

[1] Based on number of pupils eating any type of lunch served by the school. The same figures represent participation in Type A lunch except in school 35, which did not have a reimbursed program, and in five schools serving foods in addition to Type A lunches. Type A participation in the five schools is as follows: No. 13, 22 percent; No. 19, 71 percent; No. 37, 31 percent; No. 38, 24 percent; No. 39, 36 percent.
[2] Indicates pupils who refused to take milk offered, except for school No. 24, which could not obtain enough milk for all pupils.
[3] Participation lower than usual because of absences for cotton picking.
[4] Plate lunches, not reimbursed.

shop report (*2*) recommends that if workers are employed 40 hours a week, one paid worker is needed for 35 to 50 children, three for the first 100 children, and one additional worker for each 50 children above 100. It is further suggested that for each 100 children served, three students or volunteers also can be used to advantage during a 2-hour noon period daily.

On the basis of man-hours of work a week for preparing and serving lunches for 300 pupils, the first recommendation is 90 man-hours; the second is 370 man-hours. In the first instance the ratio is 1 full-time worker to 100 lunches served, and in the second it is 1 to 43.

In four of the 39 schools studied only full-time workers were employed and the ratio of workers

TABLE 2.—*Time spent by school lunch workers, 39 schools*

School No.	Lunches served	Labor cost per lunch	Total time worked	Adult workers						Pupil workers						Division of workers' time								Lunches per man-hour	Minutes expended per lunch
				Paid			Volunteer			Paid [1]			Volunteer			Preparation		Serving		Cleaning		Other duties [2]			
	No.	*Dol.*	*Hr.*	*Min.*	*No.*	*Hr.*	*Min.*	*No.*	*Hr.*	*Min.*	*No.*	*Hr.*	*Min.*	*No.*	*Hr.*	*Min.*	*Hr.*	*Min.*	*Hr.*	*Min.*	*Hr.*	*Min.*	*Hr.*	*Min.*	*No.*	*No.*
1	77	0.061	9	38	1	7	10	4	2	28	0	0	0	0	0	0	4	41	1	44	2	49	0	24	8	8
2	104	.064	13	11	2	11	30	0	0	0	3	1	41	0	0	0	2	34	3	47	3	43	3	7	8	8
3	114	.114	15	24	2	15	24	0	0	0	0	0	0	0	0	0	6	27	1	57	4	9	2	51	7	8
4	119	.053	12	8	2	12	8	0	0	0	0	0	0	0	0	0	3	59	1	38	4	31	2	0	10	6
5	138	.102	19	0	2	12	20	0	0	0	8	6	40	0	0	0	4	11	6	16	6	45	1	48	7	8
6	165	.066	16	54	2	13	0	0	0	0	6	3	54	0	0	0	8	34	2	45	3	53	1	42	10	6
7	173	.094	30	25	4	28	10	1	0	45	3	1	30	0	0	0	8	26	3	3	14	52	4	4	6	10
8	173	.052	26	43	4	26	28	1	0	15	0	0	0	0	0	0	4	37	4	6	8	28	9	32	6	9
9	175	.072	29	45	3	21	5	3	8	25	1	0	15	0	0	0	5	24	6	27	12	19	5	35	6	10
10	176	.073	21	25	3	19	25	1	0	2	6	1	58	0	0	0	7	27	6	11	6	35	1	12	8	7
11	183	.032	17	49	2	14	15	10	0	54	3	2	40	0	0	0	5	53	2	30	6	53	2	33	10	6
12	184	.079	20	42	3	20	15	0	0	0	1	0	15	3	0	12	5	35	4	20	7	12	3	35	9	7
13	185	.049	33	0	1	8	0	5	25	0	0	0	0	0	0	0									6	11
14	198	.068	17	30	3	17	30	0	0	0	0	0	0	0	0	0	4	47	2	54	5	58	3	51	11	5
15	204	.096	21	28	3	20	23	1	0	35	0	0	0	3	0	30	5	31	4	14	8	20	3	23	10	6
16	205	.058	19	50	3	19	40	0	0	0	1	0	10	0	0	0	5	0	5	18	6	57	2	35	10	6
17	210	.063	26	0	2	21	[3] 2	0	0	0	9	4	58	0	0	0	1	[4] 51	6	[4] 21	4	[4] 26	1	[4] 57	8	7
18	211	.070	31	27	4	24	35	0	0	0	9	6	52	0	0	0	8	42	7	6	10	56	4	43	7	9
19	245	.058	28	0	4	24	0	0	0	0	5	4	0	0	0	0									9	7
20	254	.055	29	10	3	22	30	0	0	0	4	6	40	0	0	0	4	55	8	15	6	15	9	45	9	7
21	304	.044	41	0	4	28	0	0	0	0	13	13	0	0	0	0									7	8
22	309	.059	36	0	4	32	0	0	0	0	4	4	0	0	0	0	10	29	5	53	10	22	9	16	9	7
23	316	.050	29	50	3	25	30	0	0	0	5	4	20	0	0	0	9	30	9	26	10	28	0	26	11	6
24	320	.063	39	35	5	36	35	0	0	0	1	3	0	0	0	0	9	20	6	48	14	42	8	45	8	7
25	326	.075	25	15	6	24	0	0	0	0	2	1	15	0	0	0	6	50	5	55	8	23	4	7	13	5
26	328	.120	47	52	6	38	37	0	0	0	11	9	15	0	0	0	7	54	7	30	21	42	10	46	7	9
27	342	.055	33	25	5	30	45	0	0	0	4	2	40	0	0	0	14	3	4	12	11	26	3	44	10	6
28	352	.053	33	45	4	30	55	0	0	0	4	2	50	0	0	0	7	35	6	3	11	46	8	21	10	6
29	355	.032	27	30	3	20	30	0	0	0	6	7	0	0	0	0									13	5
30	355	.059	65	0	5	35	0	10	30	0	0	0	0	0	0	0									6	11
31	390	.045	32	0	5	28	0	0	0	0	4	4	0	0	0	0									13	5
32	423	.034	41	15	5	31	15	3	4	10	0	0	0	14	5	50	11	17	9	32	14	5	6	21	10	6
33	442	.035	28	0	4	28	0	0	0	0	0	0	0	0	0	0									16	4
34	450	.058	37	15	6	36	15	0	0	0	1	1	0	0	0	0	4	20	6	59	12	57	12	59	12	5
35	487	.031	51	0	4	30	0	0	0	0	5	5	0	8	16	0									10	6
36	496	.066	49	0	6	45	0	0	0	0	6	4	0	0	0	0	6	55	10	44	8	42	22	39	10	6
37	525	.044	49	30	4	29	30	0	0	0	20	20	0	0	0	0									11	6
38	568	.070	58	48	6	39	23	2	2	20	17	17	5	0	0	0	20	0	15	35	22	9	1	4	10	6
39	810	.061	58	31	6	46	31	0	0	0	12	12	0	0	0	0	14	9	18	49	19	3	6	30	14	4

[1] Includes pupils who were paid either cash or lunches.
[2] "Other" duties varied from school to school, but usually included ordering food, checking deliveries, supervising, waiting to serve, eating lunch, and resting.
[3] No kitchen, most food transported from another school lunchroom. Time of 1½ workers in the other school is included.
[4] Includes only work done in school where the lunch was served.

to lunches ranged from 57 to 110 and averaged 73 per worker. The work week for each worker was 30 hours in two schools and 35 in the other two.

The number of lunches served per man-hour of labor was calculated for each of the 39 schools by totaling the hours worked by all kinds of labor and dividing the number of lunches served by this figure (table 2).

The highest number of lunches served per man-hour was 16 and the lowest was 6. In the school serving 16 lunches per man-hour (442 lunches served) four paid adults worked a 7-hour day with no pupil or volunteer assistance. Work was well organized and the kitchen was adequately equipped and efficiently arranged.

The work time per lunch served was also determined. To obtain this figure, the total minutes worked in preparing food, serving, cleaning, and other activities were divided by the number of meals served. In the 39 schools, the longest time expended per lunch was 11 minutes and the shortest 4; the average for all schools was 7 minutes.

Production may be measured by the "number of lunches served per man-hour" and the "minutes expended per lunch." The higher number of lunches served per man-hour and the fewer minutes spent per lunch reflect efficiency in school lunch management.

Amount of work performed

The amount of work to be done varied considerably from school to school. Some menus were more easily and quickly prepared than others, depending on the number of food items on the menu and the kind of foods used.

The number of different food items served in the 33 schools offering only Type A lunches, ranged from 5 to 13 (table 3). The school serving the larger number of items offered some choice within the Type A lunch. However, not all food items required major preparation in the school kitchen. Of the 242 food items served in the 33 schools on the day of this study, 52 percent were prepared by school lunch workers and the remainder were bought or prepared foods which did not need cooking or other major preparation.

The number of cleaning and other jobs that workers were required to do in addition to the preparation and serving of lunches, varied from school to school. In all schools the workers washed dishes, cleaned the kitchen equipment and dining tables, and cared for the storeroom. Some school lunch workers also cleaned the kitchen and dining room floors.

Training and experience of workers

The skills of the workers also influenced output of work and was a factor affecting the number of workers required. Many workers were homemakers, without formal training in foods and management, though some of them had worked in hotels, restaurants, hospitals, and cafeterias. Many of the managers and workers had worked in a school lunchroom several years, usually in the same school.

No previous training or experience was required for pupils who worked part-time, although some managers reported that the same pupils had worked the previous year. In two schools the home economics students worked in the lunchroom as part of their class training. In two other schools, pupils volunteered to work and received no pay or lunches in return.

Volunteer workers may or may not have had particular ability for school lunch work. In five schools, mothers assisted on a volunteer basis but received their lunches. Some teachers and school principals did productive school lunch work without additional pay for their time.

Organization of work

Practice as to supervision and management varied in the 39 school lunch programs. Most schools had a school lunch "manager" who planned menus, purchased food, kept records, hired and trained workers, and frequently did some cooking. Three lunchrooms were supervised by a dietitian who also was responsible for supervising other lunchrooms, and two were supervised by the school principal. In some instances the commercial teacher or the principal's secretary assisted with record keeping.

In most schools the work of the paid adult workers was organized very informally, without work schedules and assignments of work made in advance. Some of the workers and managers

TABLE 3.—*Factors affecting time spent by school lunch workers, 39 schools*

School No.	Total time worked	Lunches served	Food items served [1]	Foods prepared in school kitchen [2]	Length of basic food route [3]	Size of kitchen		Size of dining floor area [4]	Power machines				Major cleaning jobs by lunch workers [7]
						Floor area [4]	Floor area per lunch served [5]		Dish machine	Mixer	Peeler	Grinder, slicer [6]	
	Hr. Min.	*No.*	*No.*	*No.*	*Ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*No.*	*No.*	*No.*	*No.*	*No.*
1	9 38	77	7	5	39	261	3.4	400	0	[8]	0	0	2
2	13 11	104	8	2	34	220	2.1	637	0	0	0	0	5
3	15 24	114	6	5	49	216	1.9	729	0	0	0	0	5
4	12 8	119	6	3	44	486	4.1	972	0	0	0	0	3
5	19 0	138	8	4	94	170	1.2	712	0	1	0	0	5
6	16 54	165	7	5	32	216	1.3	1,012	0	0	0	0	3
7	30 25	173	5	4	48	240	1.4	748	1	[8]	0	0	4
8	26 43	173	7	3	40	280	1.6	1,064	0	0	0	1	4
9	29 45	175	9	4	40	483	2.8	735	0	[8]	0	0	3
10	21 25	176	5	3	52	286	1.6	2,590	1	0	1	0	3
11	17 49	183	6	5	38	322	1.8	391	0	1	1	0	5
12	20 42	184	8	5	37	380	2.1	361	0	0	0	0	4
13	33 0	185	14	7	26	320	1.7	310	0	0	0	0	2
14	17 30	198	6	4	79	257	1.3	684	0	[8] 1	0	0	5
15	21 28	204	13	11	56	652	3.2	2,852	1	1	0	0	3
16	19 50	205	6	4	42	567	2.8	547	0	0	0	0	5
17	26 0	210	8	[9]	[9]	[9]	[9]	1,368	0	0	0	0	1
18	31 27	211	7	3	59	348	1.6	1,976	0	0	0	0	3
19	28 0	245	7	4	107	220	0.9	704	1	1	0	0	4
20	29 10	254	10	4	75	336	1.3	713	1	0	0	0	3
21	41 0	304	8	5	96	573	1.9	1,195	0	1	0	1	3
22	36 0	309	6	4	50	330	1.1	1,820	0	1	1	0	4
23	29 50	316	7	3	43	368	1.2	2,250	0	1	1	0	4
24	39 35	320	10	5	79	462	1.4	2,146	1	2	1	0	5
25	25 15	326	7	4	89	552	1.7	2,664	1	1	1	0	4
26	47 52	328	8	5	54	483	1.5	1,734	1	2	0	1	3
27	33 25	342	6	6	95	433	1.3	1,530	1	0	0	0	3
28	33 45	352	5	3	41	375	1.1	1,820	1	1	1	0	4
29	27 30	355	7	2	62	594	1.7	1,800	0	1	1	1	3
30	65 0	355	6	2	80	648	1.8	1,584	0	0	0	0	2
31	32 0	390	8	2	42	378	1.0	1,452	1	0	1	0	4
32	41 15	423	8	4	50	494	1.2	2,202	1	0	0	1	5
33	28 0	442	12	5	74	514	1.2	1,352	1	2	1	0	1
34	37 15	450	6	1	35	463	1.0	3,900	1	1	0	0	5
35	51 0	487	14	7	77	528	1.1	2,304	0	1	1	2	4
36	49 0	496	6	3	54	277	.6	900	0	0	0	0	5
37	49 30	525	13	7	47	544	1.0	3,264	1	[8]	0	0	3
38	58 48	568	35	24	48	570	1.0	2,681	1	1	1	1	3
39	58 31	810	25	19	66	620	.8	2,009	1	1	1	1	4

[1] Includes food items in Type A lunch and food items offered for self-selection.

[2] Refers to preliminary preparation, cooking, baking, salad and sandwich making but not to opening, heating, and seasoning of canned foods.

[3] The measured distance from storeroom to sink supplying water for preliminary cleaning processes, to cook's table, to range, to serving counter.

[4] In some schools, the same room was divided into kitchen and dining areas.

[5] Recommended by West and Wood: 1.5 sq. ft. for 75 to 350 meals served or 1 sq. ft. for 350 to 500 meals served.

[6] Some schools had grinder or slicer attachments to the mixer.

[7] Jobs include cleaning of equipment, kitchen floor, dining room floor, dining tables, and storeroom (dishwashing not included as this was done by the school lunch workers in all schools).

[8] Had a "home-type" mixer.

[9] No kitchen, most foods transported from another school.

said they preferred rotating jobs so that they would have different types of work to do from day to day and thus avoid monotony. For example, one cook-manager took her turn with the others washing dishes on certain days. In a few schools, especially those serving the largest number of lunches, the work was well organized and specific duties were assigned to the different workers.

The plan of work for paid pupils and for pupil and adult volunteers varied from school to school but included such tasks as helping at the serving counter, preparing the dining tables for serving, buttering bread, and in a few schools, waiting on tables. Pupil workers usually assisted with scraping, stacking, and washing dishes and helped in cleaning the dining room.

Food buying required considerable time in some schools. The supervisor, manager, or school head ordered from wholesalers, local retailers, or

farmers and in some cases drove to market to pick up the food. Plans for deliveries depended largely on the location of the school, whether in town or open country. Food was brought on the school bus to some of the schools. Usually milk, and bread if bought, were delivered shortly before serving time.

Division of workers' time

The "clocked" time expended by each worker throughout the day of the study was recorded in 30 schools and tabulated to show the time spent on food preparation, serving, cleaning, and other jobs (table 2).

Activities classified as "food preparation" were getting out materials and equipment; measuring and weighing ingredients; sorting, cleaning, trimming, and cutting foods; opening and emptying cans; mixing, cooking, and baking foods; making salads and sandwiches; portioning food if done during preparation; moving food from one preparation center to another; refrigerating or storing food during preparation and prior to serving time; and putting away unused ingredients.

The time spent in preparation was analyzed to determine the length of time required to prepare each food on the menu (Appendix table 5). In 26 schools serving only Type A lunches the total time spent in food preparation for each 100 lunches ranged from 57 minutes in a school serving 450 lunches to 6 hours 5 minutes in one serving 77 lunches. The average for all 26 schools was 3 hours 10 minutes.

A comparison of the preparation time for different types of foods shows that an average of 2 hours 4 minutes was spent preparing main dishes, 1 hour 30 minutes preparing vegetable dishes, 1 hour 30 minutes preparing salads, and 1 hour preparing desserts (fig. 3). In one school serving 173 lunches, the preparation time was 23 minutes for frankfurters, 26 minutes for canned green beans, 37 minutes for stewed prunes, and 3 hours 7 minutes for mashed potatoes. In another lunchroom where potatoes were boiled with the skins on and peeled before serving, 3 hours 38 minutes were spent preparing potatoes to serve 423.

The clocked records were also analyzed to determine the length of time spent in serving.

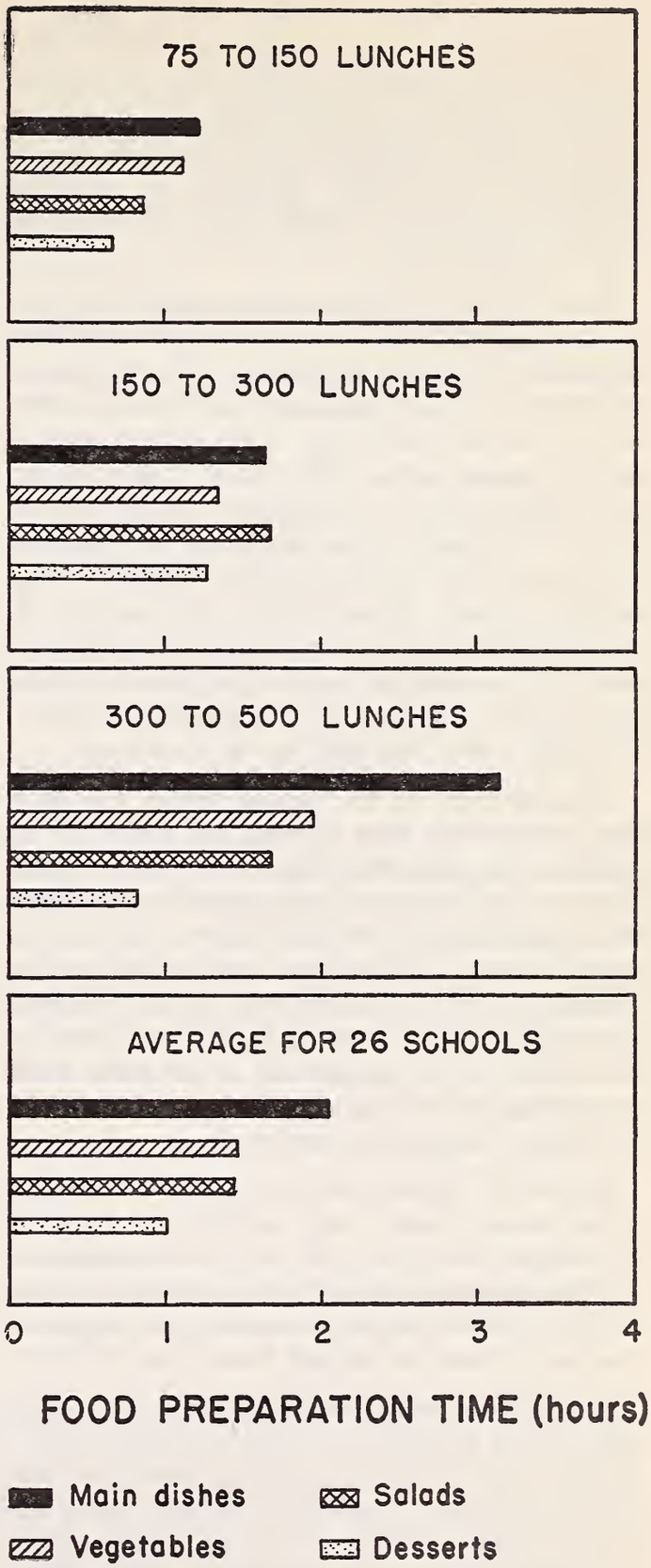

FIGURE 3.—Average time spent in preparation of main dishes, salads, and desserts in 26 schools.

Activities classified as serving were getting out and arranging dishes, silverware, trays, napkins, straws, and other serving equipment; setting up

the serving counter; moving food from the refrigerator, storeroom, range, or work center to the serving area; portioning those foods not portioned during the preparation period; putting food on plates and into other individual dishes; returning food to the kitchen for reheating between shifts; and replenishing the serving counter with food.

In 7 of the 26 schools more time was spent serving the lunch than in preparing it. The time required for serving depended on the number of individuals served, the number and kind of foods, the amount of portioning required, and the size of the dining room. The scheduling of classes also affected the time required for serving the lunch. Serving was facilitated by an even flow of pupils to the serving counter throughout the serving period. In some cases, serving was retarded because inadequate serving equipment was used. As an example, in one lunchroom the spoon used for serving peas was so small that two or three dips were required for each serving.

Placing food on the dining tables was more time consuming than serving all foods at the counter. In one school where the workers waited on the tables, 6 hours 27 minutes of workers' time were required to serve 175 lunches. In another school where 173 lunches were served at the counter, 3 hours 3 minutes were spent in serving. In a third school where all foods were placed on the dining tables except the main dish, which was served at the counter, 11 hours 46 minutes were spent in serving 352 lunches.

Bryan (*1*) states that it is possible to serve a plate lunch, dessert, and beverage to 12 to 15 pupils per minute at a 15- to 20-foot counter. In 17 schools where all foods were served at a counter, the number of pupils served per minute at the peak of service ranged from 5 to 16.

Tasks classified as cleaning included clearing the serving counter and storing left-over food; scraping soiled dishes; stacking dishes; washing dishes, silverware, glasses, trays, pots, pans, and other utensils; putting away clean dishes; wiping table tops; cleaning work surfaces, range, refrigerator, and other equipment; sweeping and mopping floors; and replacing furniture and equipment after cleaning.

Cleaning required a high proportion of school lunch workers' time. The total hours spent in cleaning varied from school to school, depending on the number served, the conditions of the kitchen, the economy of time and motion with which the dishwashing and other work was done, and whether or not school janitors assisted with the heavier cleaning, especially sweeping and mopping floors.

Workers in 21 of the 26 schools spent more time in cleaning than in food preparation on the day of the study. One school serving 328 lunches spent 21 hours 42 minutes cleaning and 7 hours 54 minutes on food preparation.

Time that could not be considered as preparation, serving, or cleaning was totaled and reported as "other" activities. These included ordering food, checking deliveries, giving directions to workers, waiting to begin the serving period after food preparation had been completed, eating lunch, and resting.

Location, size, and lay-out of lunchroom space

The location, the size, and the lay-out of kitchen and other lunchroom space affected labor requirements. The location of the lunchroom in relation to the rest of the school differed considerably from place to place. A few lunchrooms were in separate buildings erected for the purpose; others were located in converted classrooms, gymnasiums, or auditoriums; some were on the main floor, some on upper floors, and some in the basement of the school building.

Adequate storage (*11*) was lacking in many of the schools. Often storerooms were a considerable distance from the lunchroom. A few schools had no storeroom available, and supplies were stored in the kitchen, hall closets, or basement.

Extremes were found in sizes of kitchens (table 3). The kitchen floor area per lunch served ranged from 0.9 square feet to 4.08 square feet for schools serving 75 to 350 lunches, and from 0.56 square feet to 1.82 square feet for those schools serving 350 to 500. From the kitchen having 4.08 square feet per lunch, 119 lunches were served and from the one having 0.56 square feet per lunch, 496 lunches were served. West and Wood (*15*) recommend 1.5 square feet per meal for serving 75 to 350 lunches and 1 square foot per meal for 350 to 500 lunches.

Floor plans of the kitchens were used for studying the flow of work. Lines were drawn showing "actual food routes" traveled in the preparation of each dish on the menu. For comparing the efficiency of kitchens from school to school, a "basic food route" was formulated—the measured distance from storeroom door to the preliminary preparation sink, to the cook's table, to the range, and from there to the serving counter (*9*). The length of the basic route varied considerably in the different schools. In schools serving 75 to 350 meals the length ranged from 26 to 107 feet and averaged 58 feet. In schools serving 350 to 500 it ranged from 35 to 80 feet and averaged 56 feet.

The disadvantage of too much kitchen floor space had been partially overcome in some schools by a lay-out of equipment to provide a direct basic food route with little or no crosswise or backward travel. For example, the largest kitchen (on the basis of square feet per meal served) had equipment arranged so that the basic food route was only 44 feet. In contrast, the smallest kitchen had a basic food route of 54 feet, not including the distance to a reserve storeroom in another part of the building.

The recommended allowance for the size of school lunch dining rooms is 9 square feet (*15*) or 10 to 12 square feet of floor space (*1*) for each person to be seated at one time. A few schools without separate dining rooms used the same room for kitchen and dining purposes. Dining floor areas in schools serving 75 to 350 lunches ranged from 310 to 2,852 square feet and in schools serving over 350 lunches from 900 to 3,900 square feet (table 3).

In schools with small dining areas in proportion to the number served, the serving period was divided into pupil-shifts, adjusted in number and length to accommodate the total number to be served. For example, the school serving 184 lunches had a small dining room with a floor area of 361 square feet. To allow 9 square feet per seat this school could serve only 40 persons at one time. Actually the size of each group served was somewhat smaller than this as each of the six classes ate separately in shifts approximately 20 minutes long. In the school having the smallest dining area (310 square feet), the older pupils carried their lunches to their classrooms and ate at their desks.

Equipment

Labor saving equipment is commonly considered an asset toward increasing work output and reducing the number of workers needed. Equipment on hand in the 39 schools when the studies were made included 17 dishwashing machines, all in use except 1 which needed repairing. No school serving fewer than 173 lunches had a dishwashing machine. Other power machines were 22 mixers in 18 of the schools (5 home-type mixers in 5 schools not included), potato peelers in 14, and grinders or slicers in 9. Only 11 of the schools had both dishwashing machine and power mixer.

As would be expected, the larger schools had more power equipment than the smaller ones, (table 3) although one school serving 496 lunches had no power machines of any kind. The six paid adult workers and six pupil workers in this school served 10 lunches per man-hour, and these workers also did all major cleaning jobs. The lunch served in this school included six food items, three of which were prepared in the school kitchen.

Another school serving a fairly comparable number of lunches (450) had both dishwashing machine and power mixer, although the mixer was not used on the day of the study. In this school six full-time adult workers and one pupil worker served six food items, only one of which was prepared in the school kitchen. All of the cleaning tasks were also done by the school lunch workers. In comparison with 10 lunches per man-hour in the school without any power equipment 12 lunches per man-hour were served by this school.

Other equipment in use included institutional ranges in 33 schools, home-type ranges in 12, and both types in 6 schools. Various kinds of fuels—electricity, gas, coal, and wood—were in use in different schools. Ten schools had deck ovens, one had a 2-compartment steamer, and one had a steam jacketed kettle. Thirty-four schools had reach-in and six had walk-in refrigerators, three of the schools had both, three had beverage coolers, and 16 had either a freezer or ice cream cabinet. One of the smaller schools did not have a refrigerator but stored foods needing refrigeration in the beverage cooler.

Four schools had only a one-compartment sink, 25 had sinks with two compartments, and 10 had three-compartment sinks. Eighteen schools had

steam tables, 5 had overhead racks for the cook's table, and 23 had some type of scales. Some schools had small equipment which seemed adequate to their needs, while in others the workers were handicapped and delayed by the lack of essential small equipment.

Receipts and costs

Cash receipts for lunches consisted of money collected from pupils, teachers, and other adults, plus reimbursement for pupil lunches from funds appropriated under the National School Lunch

TABLE 4.—*Receipts and costs for lunches for 1 day and for a longer period, 39 schools*

School No.	Lunch served on 1 day								Estimated value of U.S.D.A. donated foods per lunch	Lunches served over a period of 3 months or longer [3]			
	Charge per meal		Reimbursement (pupil lunches)	Average cash received per lunch	Lunches served "free" [1]	Food and labor cost per lunch served				Average cash received per lunch	Average food and labor cost per lunch served		
	Pupils	Teachers				Total	Food	Labor [2]			Total	Food	Labor [4]
	Dol.	*Dol.*	*Dol.*	*Dol.*	*No.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
1	0.20	0.26	0.06	0.256	0	0.254	0.193	0.061	0.029	0.297	0.214	0.148	0.066
2	.15	.15	.08	.201	5	.193	.129	.064	.024	.141	.124	.084	.040
3	[5].20	[5].20	.05	.240	0	.252	.138	.114	.000	.298	.295	.164	.131
4	[5].15	[5].15	.08	.221	0	.226	.173	.053	.020	.226	.211	.154	.057
5	.25	.30	.055	.280	11	.261	.159	.102	.020	.249	.243	.140	.103
6	.25	.25	.09	.284	8	.272	.206	.066	.000	.280	.245	.179	.066
7	.25	.34	.09	.324	3	.236	.142	.094	.002	.347	.355	.258	.097
8	[5].13	No charge	.07	.175	7	.263	.211	.052	.012	.170	.187	.159	.028
9	.20	.30	.07	.254	6	.250	.178	.072	.000	.228	.187	.137	.050
10	.20	.30	.07	.248	6	.245	.172	.073	.006	.297	.258	.198	.060
11	.15	.15	.07	.218	4	.194	.162	.032	.000	.191	.137	.103	.034
12	.20	.20	.09	.277	3	.202	.123	.079	.003	.285	.262	.155	.107
13	.20	----	.09	----	0	.209	.160	.049	----	.174	.169	.138	.031
14	.25	.32	.07	.308	3	.228	.160	.068	.000	.336	.270	.179	.091
15	.15	à la carte	.05	.216	0	.330	.234	.096	.000	.260	.280	.185	.095
16	.16	.24	.08	.232	4	.188	.130	.058	.001	.213	.194	.131	.063
17	.20	.20	.09	.261	21	.206	.143	.063	.033	.256	.226	.178	.048
18	[5].20	[5].20	.05	.228	14	.312	.242	.070	.000	.215	.214	.163	.051
19	.12	----	.09	----	55	.211	.153	.058	----	.221	.253	.202	.051
20	.20	.20	.05	.188	7	.263	.208	.055	.024	.290	.246	.178	.068
21	.15	----	.08	----	42	.172	.128	.044	----	.242	.188	.139	.049
22	.20	.20	.09	.252	45	.247	.188	.059	.015	----	----	----	----
23	.20	.20	.09	.254	41	.222	.172	.050	.034	.242	.218	.179	.039
24	.20	.20	.07	.248	10	.169	.106	.063	.066	.206	.170	.106	.064
25	[6].21	.30	.055	.257	10	.265	.190	.075	.005	.254	.232	.178	.054
26	.20	.35	.05	.250	0	.308	.188	.120	.000	.222	.266	.191	.075
27	.15	.15	.07	.208	7	.184	.129	.055	.015	.192	.187	.133	.054
28	.20	.20	.09	.258	38	.226	.173	.053	.009	.256	.225	.179	.046
29	.10	----	.07	----	0	.127	.095	.032	----	.192	.150	.101	.049
30	.20	----	.09	----	23	.307	.248	.059	----	.295	.303	.232	.071
31	.15	----	.07	----	20	.197	.152	.045	----	.244	.205	.152	.053
32	[7].17	.17	.07	.234	1	.179	.145	.034	.012	.116	.120	.098	.022
33	.10	----	.09	----	0	.215	.180	.035	----	.240	.289	.215	.074
34	.10	.10	.09	.178	11	.182	.124	.058	.001	.243	.152	.103	.049
35	[8].20	----	[9].00	----	0	.163	.132	.031	.012	----	----	----	----
36	.20	.20	.06	.242	20	.221	.155	.066	.000	.267	.222	.155	.067
37	.20	----	.09	----	0	.201	.157	.044	.012	----	----	----	----
38	.25	.25	.07	----	0	.271	.201	.070	.000	----	----	----	----
39	[8].10	à la carte	.05	----	6	.185	[10].124	.061	.001	----	----	----	----

[1] Some pupils reported as "free" worked for their lunches.
[2] Labor cost includes food cost of workers' lunches.
[3] From records furnished by the school or State agency.
[4] Labor cost does not include food cost of workers' lunches since that information was not available.
[5] At weekly rate which was lower than daily rate.
[6] Average paid ($0.20 for grades 1 through 4, $0.22 for other grades).
[7] Graded pay scale ($0.17 if one pupil from a family, $0.15 if two, $0.13 if three, and $0.11 if four or more).
[8] Plate lunch (milk, bread, and margarine extra).
[9] Not a reimbursed program.
[10] Cost shown for a typical Type A lunch.

Act (*12*). The amount of reimbursement ranged from 5 to 9 cents per pupil lunch.

The price of the lunch to pupils ranged from 10 to 25 cents. Some schools offered a weekly rate which slightly reduced the daily price and in these cases the lower price was used in summarizing the data. Some adults paid more than pupils as only pupil lunches were eligible for cash reimbursement.

For purposes of comparison, the daily cash receipts were reduced to the "average received per lunch" by dividing the total by the number of all lunches served (table 4). This average differs from the selling price of the lunch plus reimbursement per lunch, since not all lunches were reimbursed and some lunches were served "free." The average cash received per lunch was 24 cents.

Food and labor costs.—The principal items of cost paid from school lunch receipts were for food and labor (table 4). Space, utilities, and janitor service were usually furnished by school boards. Although costs for maintenance of equipment and replacement were usually paid from school lunch income, they occurred at infrequent and irregular intervals and none appeared in any school on the day of the study. Records showing minor and miscellaneous expenses, including laundry, were not always available. Any reserve accumulating in the schools from the small balances between receipts and costs or from occasional cash contributions to the school lunch program was used for payment of items other than food and labor, including equipment.

Food costs, not including the value of donated foods, were calculated for each item served in the lunch from the quantity of each food ingredient used and the buying price. The total recipe cost was divided by the number of portions prepared to determine the cost per serving. The food cost per lunch was obtained by adding the cost per serving of each food item in the lunch. The average food cost per lunch for the 39 schools was 17 cents.

Expenditures for food would have been higher without the donated foods. At wholesale prices, the USDA donated foods constituted a saving in the day's food budget of from 18 cents to $10.92. For 4,496 lunches served on 1 day in the 22 schools, the total value of these foods amounted to $71.63. The school effecting the greatest saving used nine Government donated foods at a saving which averaged 6.6 cents per lunch. Four schools used some food donated by local groups thereby saving from 0.1 to 2.5 cents per lunch.

The labor cost depended on the number of workers employed and the prevailing wages in the community. Daily labor costs were calculated from weekly or monthly rates. The food cost of the lunches eaten by paid adults, volunteer workers, and pupils receiving lunch as payment for work was calculated and added to the cash paid as wages. The food cost of lunches eaten by working pupils who received cash payment and in turn paid cash for their lunches was not charged to labor. The food cost of lunches furnished to volunteers and pupil workers over a period of time added more to the cost of labor than some schools probably realized.

The total daily labor cost was divided by the number of lunches served to obtain the labor cost per meal. For the 39 studies the average labor cost per lunch was 6 cents; the food and labor cost averaged 23 cents. Figure 4 relates food and labor costs and receipts from pupil lunches in four selected schools to percentages of recommended daily dietary allowances furnished by the lunches served.

Longer period receipts and costs.—Operations relating to only one lunch may not have been typical in respect to participation and food cost. Therefore financial records covering a period of 3 months or more were obtained from 34 schools where records were available. These were used to calculate the average receipts and costs for a longer period for comparison with the receipts and costs on the day of the study (table 4).

Records for the lunch on 1 day showed that some schools spent more than they collected, some gained a few cents on each meal, while in others income and expenditures balanced. However, the gains or deficits on 1 day tended to narrow or disappear over the longer period. For example, one school showed a gain of 9 cents per lunch on the day of the study but had a loss of 1 cent per lunch for the longer period. Another showed a deficit of 8 cents per lunch on the day studied while over a longer period the receipts and costs balanced. For the longer period the average food cost in the 34 schools was 16 cents and the labor cost 6 cents, making the food and labor cost average 22 cents; the average cash received per lunch was 24 cents.

The average labor cost for the 39 schools was not quite one-fourth of the average food and labor cost, which is considered a satisfactory proportion (*15*).

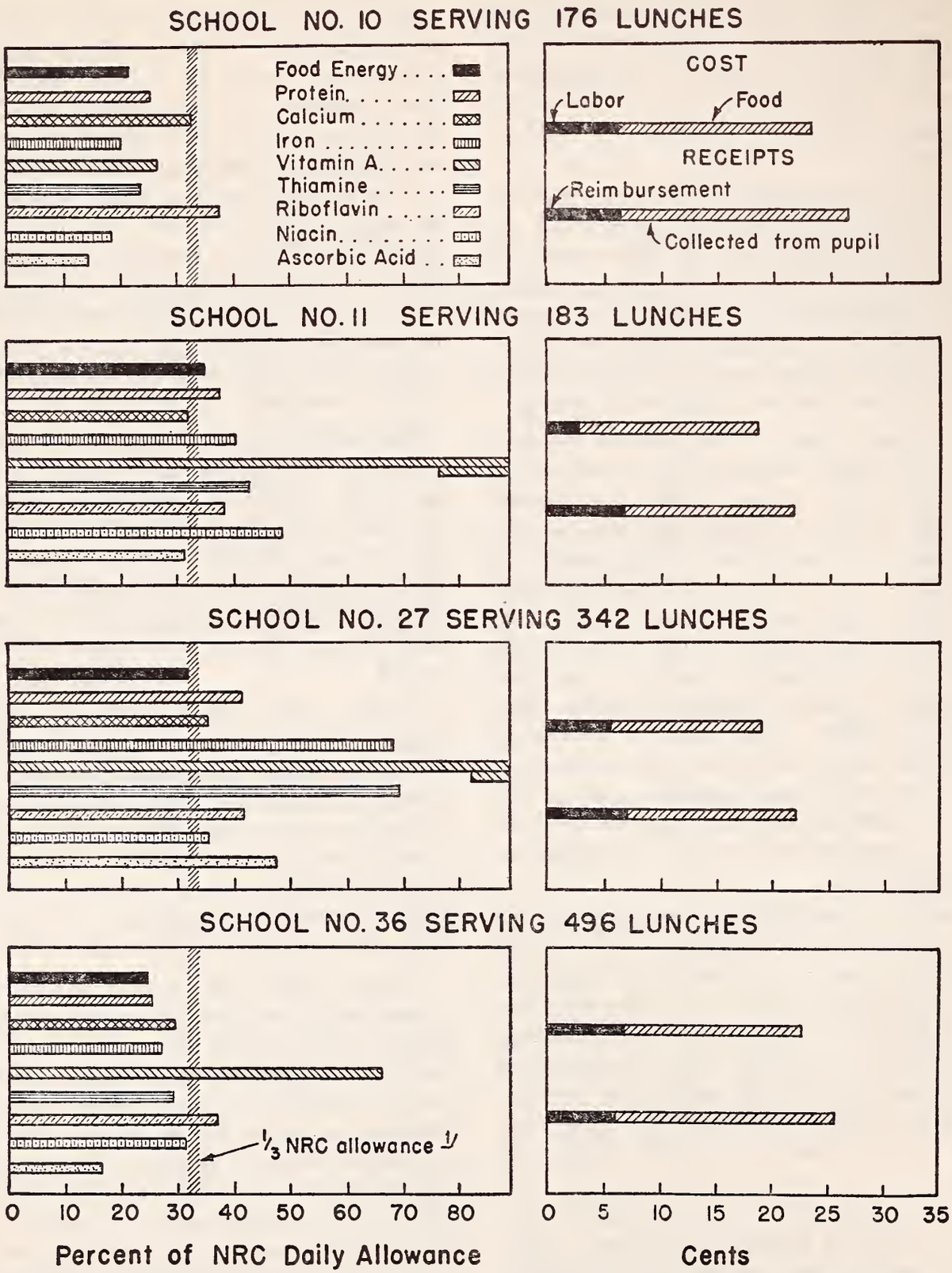

FIGURE 4.—Percentages of recommended daily allowances for nutrients contributed by lunches in four schools, related to food and labor costs and receipts per pupil lunch. (Nutritive values calculated from Tables of Food Composition in Terms of Eleven Nutrients, Misc. Pub. 572, and other Bureau sources.)

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[1] One-third of National Research Council's recommended daily allowances for children 10 to 12 years old.

DISCUSSION

Although the schools included in the study were selected as having comparable school lunch programs, they were found to differ greatly in the calculated nutritive value of lunches, the type and cost of labor, methods of operation, finances, space, and facilities. Most of the schools served only Type A lunches, a few offered an assortment of other foods for choice in addition to the Type A or a plate lunch. In one school (No. 17) the usual kitchen facilities were lacking and food for the Type A lunch was delivered by car in insulated food carriers shortly before the serving period, except bread and milk which were delivered directly to the school.

Each school lunch program was studied as a separate case and the characteristics were considered individually. Since the programs were not necessarily representative, generalization has been avoided in presenting results. Located as they were throughout the country, the programs were expected to reflect varying regional food customs and the use of diverse food supplies. Some uniformity in the lunches was evident; this could be accounted for by the use of the Type A lunch pattern. For comparing one program with others, averages were obtained in many instances and some results were reduced to a 100-meal basis.

One outcome of the work has been the development of a technique for making case studies by which local groups can evaluate the various operational aspects of their school lunch programs and compare results with findings reported here and elsewhere. The study may be repeated from year to year in the same school to measure growth toward such goals as maximum pupil participation and provision of highly acceptable lunches to meet nutritional recommendations.

An example of a study made in the same school in two successive years is shown in this publication—school No. 22, studied in 1947 and again in 1948 (reported as No. 28). The second year more pupils were participating although the school enrollment was lower. Plate waste was lower, particularly for milk (total plate waste was 3.07 pounds per 100 lunches the second year, as compared with 7.09 pounds per 100 lunches the first year). The output of work was greater the second year (8 lunches per man-hour in 1947 and 10 lunches per man-hour in 1948). The basic food preparation route had been shortened by cutting a door between the kitchen and storeroom, a soiled dish return window had been cut between the dining room and kitchen so that pupils could return their own soiled dishes, and a dishwashing machine had been installed.

Through efficient management and use of satisfactory equipment arranged for greatest economy of workers' time and energy, lunches having adequate nutritional value may be brought within the means of more pupils needing the benefits of the school lunch, including those who cannot afford to pay for their lunches.

School administrators and the community may or may not be aware of the conditions under which the school feeding program operates. A study of the management aspects and facilities in use is recommended to reveal limitations preparatory to increasing the effectiveness of school lunch operations.

HIGH ACHIEVEMENT IN SCHOOL LUNCH MANAGEMENT

Outstanding examples of high achievement in school lunch management in the schools studied are cited below.

High nutritive value.—School No. 23 served a lunch that provided more than one-third of the daily recommended dietary allowances for all nutrients calculated.

Low plate waste.—Schools No. 6 and No. 3 had little plate waste—5 ounces from 165 lunches and 12 ounces from 114 lunches, respectively.

High acceptance of foods.—Schools No. 6 and No. 3 had high food acceptance. Foods offered as part of the lunch were seldom refused and a high percentage of pupils ate all foods served.

Liberal use of donated foods.—School No. 26 used nine kinds of USDA donated foods at a saving of $0.066 per lunch.

Full participation.—School No. 32 had 100 percent participation in the lunch program.

Efficient use of labor.—School No. 33 served 16 lunches per man-hour; four paid adults worked a 7-hour day without pupil or volunteer assistance.

Well-balanced division of workers' time.—School No. 6 spent 51 percent of time preparing food for 165 lunches, 16 percent serving, 23 percent cleaning, and 10 percent on "other" duties to serve 10 lunches per man-hour.

Satisfactory space and equipment.—In school No. 34 the kitchen floor area was 1.1 square feet per lunch served (approximating the 1 square foot recommended for 350 to 500 lunches). Power equipment included a dishwashing machine, a mixer with attachments, and a peeler.

Desirable basic food route.—School No. 34 had a direct basic food route 41 feet long with no backward or cross travel.

Low costs for food and labor.—School No. 29 showed a food cost of 9.5 cents and a labor cost of 3.2 cents with a total of 12.7 cents per lunch.

Low price charged pupils.—Schools No. 29, No. 33, and No. 22 charged the pupils only 10 cents for a complete lunch.

Adequate provision of free lunches.—School No. 19 served 22 percent of its lunches free, 55 from a total of 245. They were entirely free; the school received no cash or labor from the pupils in return for the lunch.

EVALUATE YOUR SCHOOL LUNCH MANAGEMENT

Study your school lunch operations (the schedule on page 35 suggests a method) and answer the questions below, comparing your results with those from the 39 schools, especially the high achievements reported on page 19.

1. Did the lunch include the kind and quantities of food needed to meet Type A requirements? (Check the quantities of foods that were used for the total number of lunches served.)
2. Did the calculated nutritive value of the lunch compare satisfactorily with one-third of the National Research Council's daily recommended food allowance? (A nutritionist or other qualified person would need to make these calculations.)
3. What percentage of pupils attending school ate the school lunch?
4. How many pupils left edible food on their plates?
5. Which foods did they leave?
6. What was the weight or measure of plate waste?
7. Did pupils refuse to take any food offered as part of the lunch?
8. How did plate waste and refusals of food for this lunch compare with that of other days?
9. How do you account for the refusals and plate waste, if any?
10. How much time in total man-hours was spent preparing the food for this lunch? How much time was spent in serving it? On this day, how much time was spent in cleaning, including the dishwashing?
11. How many lunches were produced per man-hour of work? (Number of lunches served to pupils and adults divided by the total hours of actual work by all workers.)
12. Was the work planned in advance and were assignments made to each worker?
13. What was the total cost of food, excluding donated food, used in the lunches? What was the estimated value of donated food?
14. What was the food cost per lunch? (Divide total food cost by number of lunches served to pupils and adults.)
15. What was the total cost of labor for 1 day? (Add the cash wages per day and the food cost of workers' lunches.)
16. What was the labor cost per lunch? (Divide total labor cost for the day by the number of pupils and adults served.)
17. Did the labor cost per lunch exceed one-fourth of the total cost of food plus labor?
18. Was the selling price of the lunch low enough to encourage participation?
19. Were lunches provided free for all pupils who were not able to pay?
20. Could the food cost of the lunch have been reduced by greater use of donated foods?
21. How many foods were bought at wholesale prices?
22. Were dependable standardized recipes used to control quantity of food prepared and to produce palatable foods?
23. Is the supply of small equipment adequate including items for uniform portioning and serving?
24. Is large equipment arranged so that food moves along smoothly during preparation without backtracking and cross travel by the workers?
25. Can you rearrange equipment to make the food route more direct?
26. Is a storeroom adjacent to the kitchen? Does it open into the kitchen?

27. Do you take inventories at regular intervals?
28. Do you keep daily records of income and expenditures and the number of pupils and of adults served. Do you prepare "profit and loss" statements periodically?
29. Do you and the other workers have an opportunity to visit other school lunchrooms occasionally to get new ideas?
30. Have you attended training meetings to learn approved methods of quantity food preparation and school lunch management?

LITERATURE CITED

(1) Bryan, M. de G.
1943. the school cafeteria. Ed. 2, 740 pp., illus. New York.

(2) Cate, H. D., compiler.
1944. reports of individual participants, study groups and committees, workshop in school lunch supervision, florida state college for women, tallahassee, florida, july 3–july 21, 1944. 100 pp. Fla. State Dept. Ed. Tallahassee. (Processed.)

(3) Dreisbach, M.B.
1947. some criteria for evaluating school lunch programs. Amer. Dietet. Assoc. Jour. 23: 856–861, illus.

(4) National Research Council, Food and Nutrition Board.
1948. recommended dietary allowances. Reprint and Cir. Ser. 129, 31 pp. (Rev. ed.)

(5) New Jersey State Nutrition Council, Committee on School Lunch, and New Jersey State Department of Public Instruction.
1943. minimum standards for school lunch service in new jersey. Bul. 5, 14 pp. [Processed.]

(6) United States Bureau of Human Nutrition and Home Economics.
1946. national food guide. U. S. Dept. Agr. AIS–53, 8 pp., illus.

(7) ———
1947. quantities of food for serving school lunches. U. S. Dept. Agr. PA–45, 18 pp.

(8) ——— and National Research Council.
1945. tables of food composition in terms of eleven nutrients. U. S. Dept. Agr. Misc. Pub. 572, 30 pp.

(9) ——— and Production and Marketing Administration.
1948. increasing the efficiency of the school lunch kitchen. U. S. Dept. Agr. PA–61, 21 pp., illus.

(10) ——— and Production and Marketing Administration.
1948. small equipment for the school lunch. U. S. Dept. Agr. PA–59, 8 pp.

(11) ——— and Production and Marketing Administration.
1949. storage for school lunch food and supplies. U. S. Dept. Agr. PA–63, 11 pp., illus.

(12) United States House of Representatives.
1946. national school lunch act. Public Law 396, 79th Congress, 2d Session; H. R. 3370, 5 pp.

(13) United States Production and Marketing Administration.
1949. the direct distribution of food. U. S. Dept. Agr. PA–77, 4 pp.

(14) ———
[n. d.] national school lunch program. type a lunch. 1 p. (Wall chart.)

(15) West, B. B., and Wood, L.
1945. food service in institutions. Ed. 2, 599 pp., illus. New York and London.

APPENDIX A. TABLE OF NUTRITIVE VALUES OF THE LUNCHES

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;[1] plate waste; preparation time; and expense for food*

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste		Time spent preparing food	Expense for food per serving [3]
										Waste index [2]	Participants leaving edible food		
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*	*Hr. Min.*	*Dol.*
School 1 (77 lunches):													
Orange juice [4]	2	1	0.8	2	2	5	1	2	55	0	0	8	0.001
Creamed chicken	7	26	2	15	.2	10	9	63	(*)	2.47	21	1 18	.067
on mashed potatoes [4]	5	4	3	8	1	12	4	12	28			1 54	
Molded apple-pineapple salad	3	2	.7	2	1	2	.6	.8	4	.39	5	30	.029
Bread and butter sandwich	8	6	2	8	6	11	4	10	0	.39	10	20	.028
Cherry cobbler	7	3	2	5	5	6	4	4	1	.52	6	31	.028
Milk	7	12	24	2	9	8	23	2	4	1.43	10	0	.040
Total	39	54	34	42	24	54	46	94	92	5.20	----	4 41	.193
School 2 (104 lunches):													
Orange juice [4]	3	2	1	3	3	8	2	2	80	.10	2	5	.001
Lima beans, dried	8	16	3	33	2	26	7	9	1	4.13	19	47	.027
Diced beets, canned	.7	.4	.5	2	.1	(*)	.6	(*)	3	.86	27	5	.008
Cabbage-carrot-raisin salad	4	1	2	7	32	4	2	2	13	2.88	27	1 29	.019
Bread [4]	5	6	2	7	0	9	4	8	0	.86	21	0	.000
Raw apple	4	.6	.7	3	3	4	2	2	8	----	----	8	.014
Doughnut [4]	8	4	3	9	1	6	3	5	0	.77	7	0	.000
Milk	7	12	24	2	9	8	23	2	4	.10	2	0	.060
Total	40	42	36	66	50	65	44	30	109	9.70	----	2 34	.129
School 3 (114 lunches):													
Ground beef in gravy	4	7	.2	7	0	4	3	12	0	.18	4	20	.025
on mashed potatoes	7	6	4	11	2	17	7	18	41			2 17	.021
Pickled beets, canned	1	.7	.7	2	.2	.8	.6	.8	3	0	0	6	.009
"Homemade" bread-peanut butter-margarine sandwich	6	6	2	6	2	8	5	16	1	.05	4	1 51	.022
Apple crisp	6	1	.5	3	4	4	2	3	5	0	0	1 53	.014
Milk	7	12	24	2	9	8	23	2	4	.44	1	0	.047
Total	31	33	31	31	17	42	41	52	54	.67	----	6 27	.138
School 4 (119 lunches):													
Scalloped meat and potatoes [4]	11	16	2	17	.6	12	7	28	13	6.72	34	2 15	.069
Green beans, canned [4]	1	1	2	11	9	2	2	2	5	2.86	26	9	.012
Cabbage-green pepper salad	1	.6	.9	2	.7	2	1	.8	17	.84	26	29	.006
Bread and margarine sandwich	7	5	2	7	3	8	3	8	0	.42	25	41	.019

Raw apple	3	.6	.6	3	2	3	1	2	7				25	.022
Milk	7	12	24	2	9	8	23	2	4	1.68	13		0	.045
Total	30	35	32	42	24	35	37	43	46	12.52		3	59	.173
School 5 (138 lunches):														
Orange juice [4]	1	.7	.4	2	1	3	.6	.8	31	.22	1		6	.000
Creamed chicken on biscuit [4]	10	16	7	13	3	17	13	30	5	1.59	12	1	30, 58	.072
Cabbage-green pepper salad	1	.8	2	2	1	2	2	.8	24	1.01	17	1	1	.013
Fruit jello [4]	2	2	.2	.8	1	(*)	(*)	.8	(*)	.36	6		15	.019
White and rye bread	3	3	.8	2	0	4	1	3	0	.22	4		15	.010
Margarine	1	(*)	(*)	(*)	1	0	0	0	0					
Milk	7	12	24	2	9	8	23	2	4	1.38	9		0	.045
Coffee (for adults)													6	
Total	25	34	34	22	16	34	40	37	64	4.78		4	11	.159
School 6 (165 lunches):														
Creamed chicken on mashed potatoes	5, 7	15, 6	.8, 5	10, 8	(*), 4	8, 13	6, 7	37, 14	0, 32	.06	3	2, 3	1, 4	.072
Molded mixed fruit salad with dressing	3	1	.4	2	2	.8	.6	.8	1	.04	2		48	.034
Pickled beets, canned	2	.6	.7	2	.1	(*)	.6	(*)	3	0	0		7	.012
Bread and butter sandwich	6	4	2	6	7	8	3	7	0	.02	.6		51	.029
"Homemade" butterscotch cooky	3	1	.6	2	.3	2	1	2	(*)	.02	.6	1	37	.009
Milk	7	12	24	2	9	8	23	2	4	.04	.6		0	.050
Coffee (for adults)													6	
Total	33	40	34	32	22	40	41	63	40	.18		8	34	.206
School 7 (173 lunches):														
Scalloped potatoes and ham	8	8	6	9	4	18	8	14	23	.52	2	3	6	.033
Apple-celery-grape salad	4	.6	.8	2	1	2	1	.8	3	.29	2	2	6	.016
Ground roast beef-butter sandwich	9	9	3	11	4	13	6	13	0	.17	3	1	36	.029
Gingerbread [4] with whipped cream	7	2	4	11	3	22	4	7	(*)	.06	.6	1	36	.019
Milk	7	12	24	2	9	8	23	2	4	.03	1		0	.045
Coffee (for adults)													2	
Total	35	32	38	35	21	63	42	37	30	1.07		8	26	.142
School 8 (173 luncheS):														
Frankfurters	6	17	.6	15	0	12	10	15	0	.46	14		23	.078
Mashed potatoes [4]	7	4	4	7	5	10	5	11	.25	2.54	34	3	7	.010
Green beans, canned	2	1	2	12	9	2	3	2	5	2.20	43		26	.039
Bread	4	4	2	6	0	8	3	7	0	1.44	36		0	.009
Butter	2	(*)	.8	(*)	5	(*)	(*)	(*)	0	.35	25		0	.011
Stewed prunes, dried	4	.1	1	10	13	2	3	4	1	1.68	24		37	.021
Milk	6	11	23	2	8	7	22	2	4	3.47	12		0	.043
Tea (for adults)													4	
Total	31	37	33	52	40	41	46	41	35	12.14		4	37	.211
School 9 (175 lunches):														
Lima beans, dried	5	8	3	22	0	13	3	5	(*)	1.31	18		55	.010
Cheese	2	5	11	.8	6	.8	4	(*)	0	.74	19		11	.017
Creamed corn, canned	2	2	.4	2	3	9	2	4	4	1.37	17		49	.015
Stewed tomatoes, canned	2	1	.8	4	16	3	2	5	15	2.74	29		22	.016
Potato salad [4]	4	3	1	6	3	8	3	8	21	1.66	21	2	59	.020

See footnotes at end of table.

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;*[1] *plate waste; preparation time; and expense for food*—Continued

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste		Time spent preparing food	Expense for food per serving [3]
										Waste index [2]	Participants leaving edible food		
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct*	*Hr. Min.*	*Dol.*
School 9 (175 lunches)—*Continued*													
Bread	4	5	2	6	0	8	3	7	0	0.23	16	0	0.011
Margarine	.8	(*)	(*)	(*)	1	0	0	0	0	.17	14	0	
Sliced peaches, canned	3	.6	.4	3	10	.8	1	6	5	.06	.6	7	.034
Milk	7	12	24	2	9	8	23	2	4	1.37	9	0	.055
Coffee (for adults)												1	
Total	30	37	43	46	48	51	41	37	49	9.65		5 24	.178
School 10 (176 lunches):													
Scalloped corn, canned	5	5	2	6	8	4	5	8	7	1.48	11	1 11	.037
Egg salad—butter sandwich	9	8	3	10	10	11	7	8	(*)	.40	6	4 12	.047
Sweet pickle slices	.1	.1	.5	2	1	(*)	.6	(*)	3	.23	9	1	.006
Vanilla pudding with pineapple chunks [4]	2	2	4	.8	.3	2	3	.8	1	.80	11	2 1	.042
Milk	7	12	24	2	9	8	23	2	4	.45	6	0	.040
Coffee (for adults)												2	
Total	23	27	34	21	28	25	39	19	15	3.36		7 27	.172
School 11 (183 lunches):													
Beef stew with potatoes	8	15	2	17	.6	13	6	28	24	.87	9	3 6	.048
Carrot-raisin salad	8	1	2	8	88	4	2	2	3	.60	12	1 19	.026
White and whole-wheat bread	6	7	3	10	0	12	4	12	0	.16	10	0	.012
Dutch apple cake	7	4	2	5	5	7	4	5	1	.44	6	1 28	.026
Milk	7	12	24	2	9	8	23	2	4	.05	2	0	.050
Total	36	39	33	42	103	44	39	49	32	2.12		5 53	.162
School 12 (184 lunches):													
Black-eyed peas, canned	7	15	3	29	1	31	6	8	3	.43	12	15	.028
with raw onion										.05	6	10	
Baked sweetpotatoes	6	3	3	7	199	9	4	7	35	.98	12	1 30	.006
Cabbage-apple-carrot salad	2	.8	2	2	22	2	1	.8	21	.58	13	1 36	.012
Corn meal muffins [4]	7	2	4	.8	1	2	4	(*)	(*)	.49	15	1 18	.011
Margarine	2	(*)	(*)	(*)	3	0	0	0	0	.05	9	26	.005
Raw apple	3	.4	.5	2	2	3	1	2	7	0	5	20	.011
Milk	7	12	24	2	9	8	23	2	4	.03	.6	0	.050
Total	34	33	36	43	237	55	39	20	70	2.61		5 35	.123

School 13 (185 lunches):														
Omelet										.27	2			
Boiled potato										.14	1			
Diced carrots										.34	3			
Bread and jelly										.06				
Milk										.27				
Total	23	28	29	25	155	26	37		10	1.08				.160
School 14 (198 lunches):														
Macaroni and cheese	9	15	22	4	11	6	12	6	1	1.97	12	1	53	.041
Peas, frozen	1	2	.3	2	2	10	2	4	8	.71	12		20	.023
Carrot and celery sticks	.2	.3	.5	.8	16	(*)	.6	(*)	1	.20	12	1	3	.006
White and whole-wheat bread and butter sandwich.	8	8	3	12	3	14	6	15	0	.15	7	1	11	.022
Prune plums, canned	3	.4	.6	8	4	2	1	2	1	1.72	10		15	.023
Milk	7	12	24	2	9	8	23	2	4	1.31	11		0	.045
Coffee (for adults)													5	
Total	28	38	50	29	45	40	45	29	15	6.06		4	47	.160
School 15 (204 lunches):														
Choice of:														
Chicken and noodles	5	12	.8	8	1	5	4	26	(*)	2.20	24	1	5	.053
or tuna and noodles	6	12	6	6	3	4	7	16	(*)				17	.051
Choice of:														
Spinach, frozen	2	3	(*)	23	176	5	10	5	65	.34	6		9	.058
Diced beets, canned	3	1	1	5	2	.8	2	.8	5	.29	5		6	.019
Green beans, frozen	2	1	2	4	7	2	2	2	7	.20	5		4	.028
Peas, frozen, and carrots	3	2	.8	4	45	12	3	6	11	.20	6		4	.081
Cream of tomato soup	4	6	9	8	34	8	12	12	28	1.72	8		17	.032
Cabbage-carrot-celery salad	1	.7	1	2	20	2	1	.8	19	.20	6		25	.010
Choice of:														
Banana cream pie	11	4	7	7	6	8	10	5	3	.52	6	1	33	.044
Pumpkin pie	10	6	4	8	39	7	8	6	(*)	.10	3		50	.036
Raspberry jello	3	2	0	(*)	0	0	0	0	0	.05	2		20	.012
White and whole-wheat bread and orange marmalade sandwich.	3	2	1	4	(*)	4	2	5	1	.10	9		21	.008
Milk	7	12	24	2	9	8	23	2	4	.49	6		0	.052
Total										6.41		5	31	
Typical menu chosen:														
Chicken and noodles	5	12	.8	8	1	5	4	26	(*)					.053
Spinach, frozen	2	3	(*)	23	176	5	10	5	65					.058
Diced beets, canned	3	1	1	5	2	.8	2	.8	5					.019
White and whole-wheat bread and orange marmalade sandwich.	3	2	1	4	(*)	4	2	5	1					.008
Banana cream pie	11	4	7	7	6	8	10	5	3					.044
Milk	7	12	24	2	9	8	23	2	4					.052
Total	31	34	34	49	194	31	51	44	78					.234
School 16 (205 lunches):														
Lima beans, dried	7	10	2	20	0	17	4	6	1	1.66	9	1	11	.017
Turnip greens, canned	3	3	9	15	106	2	6	6	29	2.20	14		31	.023
Harvard beets, canned	2	.7	.6	2	1	31	.6	.8	3	1.22	11		27	.012
Corn bread [4]	5	5	3	3	(*)	6	5	3	(*)	1.46	17		57	.008

See footnotes at end of table.

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;*[1] *plate waste; preparation time; and expense for food*—Continued

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste		Time spent preparing food	Expense for food per serving [3]
										Waste index [2]	Participants leaving edible food		
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*	*Hr. Min.*	*Dol.*
School 16 (205 lunches)—*Continued*													
Baked apple	6	0.4	0.5	2	3	3	1	2	5	1.61	9	1 54	0.015
Milk	7	12	24	2	9	8	23	2	4	.88	2	0	.055
Total	30	31	39	44	119	67	40	20	42	9.03	----	5 0	.130
School 17 (210 lunches):													
Grapefruit-orange juice [4]	3	.8	.8	3	.5	3	1	2	52	0	0	36	.001
Baked beans [4]	12	22	8	56	17	38	10	20	8	2.00	28	(5)	.031
Frankfurters	2	5	.2	4	0	3	3	4	0	.10	3	(5)	.024
Cabbage-green pepper salad	1	.7	2	2	1	2	1	.8	28	1.14	22	(5)	.013
White and whole-wheat bread and margarine sandwich.	6	6	2	8	3	9	4	10	0	.19	12	1 7	.015
Scalloped apples [4]	3	.3	.2	2	2	2	.6	.8	3	1.24	15	(5)	.004
Cookies	1	.7	.2	(*)	0	(*)	(*)	(*)	0	0	0	3	.005
Milk	7	12	24	2	9	8	23	2	4	2.38	9	0	.050
Coffee (for adults)	----	----	----	----	----	----	----	----	----	----	----	5	----
Total	35	48	37	77	32	65	43	40	95	7.05	----	1 51	.143
School 18 (211 lunches):													
Beef-cheese-tomato-spaghetti	11	18	4	18	20	10	8	29	17	2.56	24	2 13	.074
Molded applesauce salad, cheese dressing	4	4	5	2	4	.8	2	(*)	1	5.97	56	1 52	.034
Corn, canned	4	2	2	3	5	2	2	6	5	2.08	25	22	.033
Rolls	9	8	3	11	0	15	6	13	0	.28	13	0	.018
Margarine	2	(*)	(*)	(*)	2	0	0	0	0	.19	21	20	.005
Cherry pie	12	4	.9	7	6	9	4	7	3	1.23	18	3 54	.046
Milk	5	9	18	.8	6	5	18	2	3	.71	4	0	.032
Tea (for adults)	----	----	----	----	----	----	----	----	----	----	----	1	----
Total	47	45	33	42	43	42	40	57	29	13.02	----	8 42	.242
School 19 (245 lunches):													
Beef stew with vegetables on biscuit	----	----	----	----	----	----	----	----	----	.41	6	----	----
Fruit salad	----	----	----	----	----	----	----	----	----	.51	11	----	----
Chocolate pudding, cream	----	----	----	----	----	----	----	----	----	.05	1	----	----
Milk	----	----	----	----	----	----	----	----	----	.76	5	----	----
Total	25	38	35	26	29	25	40	----	14	1.73	----	----	.153

School 20 (254 lunches):														
Meat loaf with brown gravy	11	19	2	20	12	10	8	30	11	4.61	50	1 11 / 28		.075
Candied sweetpotatoes	3	2	2	6	154	4	2	3	15	4.88	56	1	22	.019
Peas, canned	4	5	2	16	14	9	5	8	12	3.98	59		18	.027
Cabbage-carrot salad	1	.6	1	2	9	2	1	.8	19	2.52	53	1	24	.008
Rolls	10	10	4	12	0	17	7	15	0	1.73	45		7	.021
Margarine	2	(*)	(*)	(*)	3	0	0	0	0	.47	47		0	.006
Sliced peaches, canned [4]	4	.8	.6	5	14	.8	2	8	8	.87	6		5	.000
Cookies	1	.7	.2	.8	0	(*)	(*)	(*)	0	.24	8		0	.010
Milk	7	12	24	2	9	8	23	2	4	.75	6		0	.042
Total	43	50	36	64	215	51	48	67	69	20.05		4	55	.208
School 21 (304 lunches):														
Meat loaf										2.88	41			
Mashed potatoes										.74	14			
Cabbage-carrot salad										1.73	34			
"Homemade" rolls, margarine										1.15	13			
Cooky										0	0			
Milk, whole (or chocolate)										2.14	17			
Total	33	48	30	44	34	34	42		35	8.64				.128
School 22 (309 lunches):														
Vegetable-beef soup [4]	7	11	3	18	88	12	6	21	29	2.94	14	2	46	.061
Crackers	2	2	.2	2	0	.8	0	.8	0	.13	7		4	.008
Radishes	.2	.4	1	2	.2	.8	.6	(*)	9	0	0	3	4	.019
Peanut butter-peach marmalade-margarine sandwich. [4]	16	14	44	14	2	18	8	33	3	.39	6	3	27	.028
Chocolate pudding	3	1	2	(*)	.8	.8	2	(*)	(*)	1.49	9	1	3	.024
Milk	7	12	24	2	9	8	23	2	4	2.14	9		0	.048
Coffee (for adults)													5	
Total	35	40	74	38	100	40	40	57	45	7.09		10	29	.188
School 23 (316 lunches):														
Grapefruit-orange juice [4]	3	.8	1	2	1	3	.6	2	43	0	0		24	.002
Vegetable-meat pie	12	18	3	22	52	15	8	30	15	1.04	10	5	38	.090
Cheese [4]	2	6	12	1	6	.8	4	(*)	0	.09	7		18	.000
Cabbage slaw	1	.8	2	2	1	2	2	.8	25	.34	10	1	40	.012
White and whole-wheat bread and margarine sandwich.	4	4	2	6	2	7	3	8	0	.25	7	1	21	.010
Cookies	2	1	.2	6	0	(*)	(*)	.8	0	.01	.7		2	.008
Milk	7	12	24	2	9	8	23	2	4	.63	6		0	.050
Coffee (for adults)													7	
Total	31	43	44	41	71	36	41	44	87	2.36		9	30	.172
School 24 (320 lunches):														
Choice of:														
Tomato juice [4]	[6](1)	(.8)	(.3)	(2)	(14)	(2)	(1)	(3)	(13)	0	0		9	.000
or orange juice [4]	3	2	1	2	4	5	2	2	99	.09	.6		19	.000
Meat loaf [4]	8	14	1	14	7	11	7	22	11	.16	.2	2	20	.039
Candied sweetpotatoes [4]	5	2	2	4	106	5	2	3	17	.16	3	2	19	.004
Green beans, canned [4]	1	.8	1	8	6	2	2	2	3	.09	4		24	.002
Tomato-cucumber-spinach-lettuce salad	1	.4	.2	1	6	.8	.6	.8	5	.19	7		47	.011
"Homemade" bread	6	5	.5	8	0	12	6	11	0	.16	6	1	35	.010

See footnotes at end of table.

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;*[1] *plate waste; preparation time; and expense for food*—Continued

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste		Time spent preparing food	Expense for food per serving [3]
										Waste index [2]	Participants leaving edible food		
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*	*Hr. Min.*	*Dol.*
School 24 (320 lunches)—*Continued*													
Margarine	3	0.1	(*)	(*)	5	0	0	0	0	0.06	5	14	0.009
Apricot-pineapple-fig-apple cup [4]	3	.6	1	2	8	2	1	2	5	.09	.01	1 13	.007
Milk	7	12	24	2	9	8	23	2	4	.16	.6	0	.024
Total	37	37	31	41	151	46	44	45	144	1.16		9 20	.106
School 25 (326 lunches):													
Baked sausage	12	11	.3	9	0	13	6	13	0	.43	9	1 16	.071
Candied sweetpotatoes [4]	7	2	3	8	170	8	3	6	29	3.68	33	2 24	.003
Corn, canned	3	2	.2	3	4	2	2	6	5	1.26	23	27	.019
Celery sticks	.8	.1	.3	(*)	0	(*)	(*)	(*)	1	.49	16	1 21	.008
White and whole-wheat bread and butter sandwich.	6	6	2	8	2	10	4	10	0	.64	12	57	.018
Prune plums, canned	2	.3	.4	5	3	2	.6	2	1	1.41	10	15	.016
Milk	7	12	24	2	9	8	23	2	4	.89	5	0	.055
Coffee (for adults)												10	
Total	38	33	30	35	188	43	39	39	40	8.80		6 50	.190
School 26 (328 lunches):													
Pupils:													
Chicken noodle soup	1	.8	.1	1	.2	.8	.6	.8	0	0	0	8	.011
Beef-tomato-spaghetti	13	20	2	20	26	12	8	34	24	1.52	19	3 18	.085
Spinach, canned	1	2	(*)	9	102	.8	3	2	13	.91	16	25	.013
Whole-wheat bread and margarine sandwich.	8	6	2	10	4	11	4	14	0	.34	10	1 38	.019
Raw apple	2	.3	.3	2	2	2	1	2	4			20	.008
Milk	7	12	24	2	9	8	23	2	4	.09	1	0	.052
Total	32	41	28	44	143	35	40	55	45	2.86		5 49	.188
Teachers:													
Chicken noodle soup													.011
Beef-tomato-spaghetti with cheese												4	.089
Spinach, canned													.013
Cabbage-pineapple salad												38	.048
French bread												0	.008
Margarine												0	.004
Strawberry shortcake with whipped cream.												1 8	.086

Coffee													15	.022
Total													2 5	.281
School 27 (342 lunches):														
Baked beans and ham	12	22	8	52	(*)	42	9	18	1	1.26	14	3	48	.050
Candied sweetpotatoes [4]	3	1	1	2	82	3	2	2	13	.88	12	2	9	.005
Cabbage slaw	1	.7	1	2	.6	2	1	.8	24	.64	9	1	31	.010
"Homemade" bread and butter sandwich	7	5	1	9	4	13	6	12	0	.32	11	6	4	.023
Pineapple [4] in gelatin	2	1	1	2	.7	2	.6	.8	5	.35	4		30	.006
Milk	7	12	24	2	9	8	23	2	4	.99	7		0	.035
Coffee (for adults)													1	
Total	32	42	36	69	96	70	42	36	47	4.44		14	3	.129
School 28 (352 lunches):														
Vegetable-beef stew [4]	6	16	3	18	23	11	7	28	27	2.56	13	4	13	.079
Crackers	1	.8	.1	1	0	(*)	0	(*)	0	.06	3		2	.003
Raisin [4] bread and margarine sandwich	9	8	3	9	3	12	6	12	0	.08	.3	1	44	.021
Butterscotch pudding	1	1	3	(*)	1	.8	3	(*)	(*)	.23	2	1	31	.020
Milk	7	12	24	2	9	8	23	2	4	.14	.9		0	.050
Coffee (for adults)													5	
Total	24	38	33	30	36	32	39	42	31	3.07		7	35	.173
School 29 (355 lunches):														
Pork and navy beans										.84	6			
Breaded tomatoes										1.13	11			
Sliced peaches, canned										.03				
Bread, margarine										.14	2			
Sweet roll										0	0			
Milk										.07	1			
Total	38	40	36	56	42	48	42		26	2.21				.095
School 30 (355 lunches):														
Chow mein on chinese noodles with rice										4.58	9			
Bread, margarine										.56	6			
Fruit gelatin										.28	2			
Milk										1.13	5			
Total	36	46	31	29	15	32	34		11	6.55				.248
School 31 (390 lunches):														
Frankfurters										.77	6			
Candied sweetpotatoes										2.05	6			
Green beans										1.02	13			
Rolls, margarine										1.28	20			
Cookies										0	0			
Milk, whole (or chocolate)										1.28	6			
Total	34	33	31	38	111	36	38		7	6.40				.152
School 32 (423 lunches):														
Stewed beef in gravy	6	15	1	13	.1	6	4	23	1	1.09	14	2	31	.057
Boiled potatoes [4]	4	3	1	7	.5	10	2	11	25	1.32	9	3	38	.000
Sliced beets, canned	.4	.4	.3	2	.1	(*)	.6	(*)	1	.80	15		9	.004
Carrot sticks	.3	.3	.6	2	50	.8	.6	.8	1	.42	12	2	18	.003

See footnotes at end of table.

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;*[1] *plate waste; preparation time; and expense for food*—Continued

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste: Waste index [2]	Plate waste: Participants leaving edible food	Time spent preparing food	Expense for food per serving [3]
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*	*Hr. Min.*	*Dol.*
School 32 (423 lunches)—*Continued*													
Whole-wheat bread	4	6	2	9	0	10	4	12	0	0.24	6	0	0.011
Margarine	2	.1	(*)	(*)	4	0	0	0	0	.02	3	36	.007
Banana pudding	2	1	2	1	2	2	2	.8	3	.16	3	2 5	.013
Milk	7	12	24	2	9	8	23	2	4	.78	4	0	.050
Total	26	38	31	36	66	37	36	50	35	4.83	----	11 17	.145
School 33 (442 lunches):													
Macaroni and cheese	----	----	----	----	----	----	----	----	----	.18	2	----	----
Choice of:													
Spinach	----	----	----	----	----	----	----	----	----	.16	1	----	----
or asparagus	----	----	----	----	----	----	----	----	----	.11	1	----	----
Roll	----	----	----	----	----	----	----	----	----	0	0	----	----
Butter	----	----	----	----	----	----	----	----	----	0	0	----	----
Milk	----	----	----	----	----	----	----	----	----	.20	1	----	----
Total	27	35	47	24	179	24	44	----	23	.65	----	----	.180
School 34 (450 lunches):													
Chili con carne [4]	6	10	2	15	1	5	4	12	3	2.11	26	3 10	.136
Peas and carrots, canned	2	2	1	7	92	3	2	3	5	2.96	51	55	.015
Bread and rolls	4	4	2	6	0	8	3	7	0	.29	17	0	.011
Margarine	1	(*)	(*)	(*)	1	0	0	0	0		4	5	.002
Apple butter	3	.3	.4	2	0	(*)	.6	.8	1	2.02	44	10	.010
Milk	7	12	24	2	9	8	23	2	4	2.78	19	0	.050
Total	23	28	29	32	103	24	33	25	13	10.16	----	4 20	.124
School 35 (487 lunches):													
Meat loaf	----	----	----	----	----	----	----	----	----	.26	2	----	----
Browned potato [4]	----	----	----	----	----	----	----	----	----	.42	3	----	----
Green beans	----	----	----	----	----	----	----	----	----	.68	2	----	----
Bread (sold extra)	----	----	----	----	----	----	----	----	----	.13	3	----	----
Milk	----	----	----	----	----	----	----	----	----	1.03	3	----	----
Total	23	42	27	37	18	22	38	----	11	2.52	----	----	.132
School 36 (496 lunches):													
Beef-tomato-spaghetti	6	10	1	9	10	6	4	17	9	1.09	13	1 47	.037
Green beans, canned	1	1	2	8	6	2	2	2	3	.89	16	48	.021
Carrot sticks	.2	.3	.4	1	34	.8	.6	(*)	1	.38	9	2 19	.006
Bread and butter sandwich	8	7	(*)	8	5	11	4	10	0	.21	14	1 59	.024

Ice cream cone	3	2	3	(*)	3	.8	3	(*)	(*)			0		.027
Milk	7	12	24	2	9	8	23	2	4	.89	7	0		.040
Coffee (for adults)												2		
Total	25	32	30	28	67	29	37	31	17	3.46		6	55	.155
School 37 (525 lunches):														
Roast lamb										.76	7			
Mashed potatoes [4]										.38	3			
Applesauce										.14	2			
Bread, margarine										.10	4			
Milk										.57	4			
Total	31	43	29	36	15	38	42		9	1.95				.157
School 38 (568 lunches):														
Typical Type A:														
Meat loaf sandwich	16	25	3	22	5	16	10	38	(*)			1	55	.087
Gravy	.08	.1	(*)	(*)	0	(*)	(*)	(*)	0				5	.001
Mashed potatoes	5	4	3	7	2	11	4	11	25			4	53	.019
Green beans, fresh	2	4	5	9	14	8	6	6	28			4	5	.044
Margarine	2	(*)	(*)	(*)	2	0	0	0	0				0	.005
Milk	7	12	24	2	9	8	23	2	4				0	.045
Total	32	45	35	40	32	43	43	57	57			10	58	.201
Foods offered:														
Orange juice	8	.8	.9	2	1	3	.6	.8	39	0			0	
Tomato juice	.6	.8	.3	2	14	2	1	3	13	0			0	
Baked scallops	2	12	.8	13		8	7	7	3				5	
Fish balls	5	16	3	1	3	5	7	28	8				52	
Baked rosefish, frozen	4	27	2	8		6	4	35	3				25	.075
Meat loaf	8	14	1	14	7	11	7	22	11	.10			37	.070
Gravy	.08	.1	(*)	(*)	0	(*)	(*)	(*)	0				5	.001
Baked liver	3	14	.3	50	213	12	78	67	20				45	
Cottage cheese	2	14	3	2	.3	.8	8	.8	0				1	
Fried eggplant	1	2	1	3	.6	7	3	8	7				7	
Boiled cabbage	.6	1	2	2	.9	3	2	.8	37				12	
Baked sweetpotatoes	6	3	3	7	199	9	4	7	35			1	2	
Harvard beets, canned	2	.8	.7	2	1	35	1	.8	3				9	.010
Green beans, fresh	2	4	5	9	14	8	6	6	28			4	5	.044
Cauliflower	1	4	2	10	2	10	7	6	105	3.68			25	
Broccoli	1	5	11	10	78	8	12	8	157				27	
Navy beans, dry (left-over)	5	8	3	22	0	13	3	5	(*)				14	
Green beans, canned (left-over)	2	1	2	12	9	2	3	2	5					
Celery-carrot-tomato salad	1	.7	1	2	20	2	1	.8	19				36	
Cabbage salad	1	.8	2	2	1	2	2	.8	25				19	.008
Mashed potatoes	5	4	3	7	2	11	4	11	25			4	53	.019
Corn bread	5	5	3	3	(*)	6	5	3	(*)				10	
Roll	4	4	2	6	0	8	3	7	0				0	.017
Meat loaf sandwich	16	25	3	22	5	16	10	38	(*)	.72		1	55	.087
Margarine	2	(*)	(*)	(*)	2	0	0	0	0				0	.005
Peanut butter	5	7	1	30	0	3	2	28	0				0	
Jelly	2	(*)	.2	(*)	(*)	(*)	(*)	(*)	1				0	
Baked apple slices	6	.4	.5	2	3	3	1	2	5				40	
Stewed peaches, dried	7	2	2	32	41	.8	6	26	15	.67			37	
Grapefruit	2	.7	1	2	(*)	3	1	2	53				6	
Salad plate, assorted fresh fruits	3	.6	1	2	8	2	1	2	5				53	

See footnotes at end of table.

TABLE 5.—*Percentages of recommended daily allowances for nutrients contributed by foods served in lunches in 39 schools;*[1] *plate waste; preparation time; and expense for food*—Continued

School, number of lunches served, and menu	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid	Plate waste		Time spent preparing food	Expense for food per serving [3]
										Waste index [2]	Participants leaving edible food		
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*	*Hr. Min.*	*Dol.*
School 38 (568 lunches)—*Continued*													
Pie	9	4	0.8	6	2	7	4	5	7			0	
Cupcakes	6	4	2	8		.8	3	2	0			0	
Ice cream	3	2	4	(*)	5	2	4	(*)	(*)			0	
Milk	7	12	24	2	9	8	23	2	4	1.65		0	0.045
Total for all preparation										6.82		20 0	
School 39 (810 lunches):													
Typical Type A:													
Mashed potatoes	4	4	2	7	.5	10	3	11	25	.49		1 46	.009
with cheese sauce	2	5	9	.8	4	2	6	.8	1			41	.010
Harvard beets, canned	2	.8	.7	2	1	35	1	.8	3	0		17	.011
Carrot-raisin salad	2	1	2	5	142	4	2	2	4	.06		52	.010
Bread and margarine sandwich	7	6	2	8	2	10	4	9	0	.01		15	.019
Lemon meringue pie	9	4	.8	6	2	7	4	5	7	.04		3 15	.025
Milk	7	12	24	2	9	8	23	2	4	.18		0	.040
Total	33	33	41	31	160	76	43	31	44	.78		7 6	.124
Foods offered:													
Orange juice	8	.8	.9	2	1	3	.6	.8	39	.05		51	.025
Chicken noodle soup	1	2	.2	.8	.3	.8	.6	2	(*)	.37		36	.015
Crackers	2	2	.2	2	0	.8	0	.8	0	0		2	.005
Mashed potatoes	4	4	2	7	.5	10	3	11	25	.49		1 46	.009
with cheese sauce	2	5	9	.8	4	2	6	.8	1			41	.010
Hamburger on bun	10	14	2	14	0	11	6	20	0	0		1 26	.068
Frankfurter on roll	8	14	2	10	0	14	9	16	0	0		3	.072
Harvard beets, canned	2	.8	.7	2	1	35	1	.8	3	0		17	.011
Carrot-raisin salad	2	1	2	5	142	4	2	2	4	.06		52	.010
Asparagus salad	2	4	2	12	18	7	7	8	21	.01		24	.040
Cottage cheese salad	4	21	5	3	1	2	12	.8	(*)	.04		20	.036
Apple salad (left-over)	4	.6	.8	2	1	2	1	.8	3	.04		5	
Chicken-margarine sandwich	8	11	3	10	3	10	6	14	(*)	.02		24	.035
Cheese-margarine sandwich	9	11	14	8	9	10	9	9	0	.02		27	.034
Bread-margarine sandwich	7	6	2	8	2	10	4	9	0	.01		15	.019
Apple betty	8	3	1	5	2	5	2	6	1	.06		1 20	.032
Lemon meringue pie	9	4	.8	6	2	7	4	5	7	.04		3 15	.025
Sliced peaches, canned	2	.4	.3	2	8	.8	1	5	4	0			.022
Figs, canned [4]	3	.7	2	2	.7	2	1	.8	0	.01		3	.000
Chocolate pudding (left-over)	3	.1	2	(*)	.8	.8	2	(*)	(*)	.06		3	

"Homemade" ice cream: Banana, strawberry, butterscotch, or chocolate.	3	2	4	(*)	5	2	4	(*)	(*)	0	------	56	.017
Coffee (for adults)	------	------	------	------	------	------	------	------	------	------	------	3	------
Cupcakes	6	4	3	8	0	.8	3	2	0	------	------	0	------
Potato chips	------	------	------	------	------	------	------	------	------	------	------	0	------
Milk shakes	------	------	------	------	------	------	------	------	------	------	------	------	------
Sodas	------	------	------	------	------	------	------	------	------	------	------	------	------
Milk	7	12	24	2	9	8	23	2	4	.18	------	0	.040

*Indicates trace.

[1] Percentages are based on the total food served or used in recipes, divided by the total number of lunches served. The nutrients furnished by similar foods sometimes differ from school to school because ingredients in recipes and the average size of serving varied. The nutritive values are calculated from Tables of Food Composition in Terms of Eleven Nutrients, Miscellaneous Publication 572, and other Bureau sources. Day's dietary allowances used for 10- to 12-year-old children, as recommended by the National Research Council, Reprint and Circular Series 129, revised 1948.

[2] Calculated pounds of waste per 100 lunches.

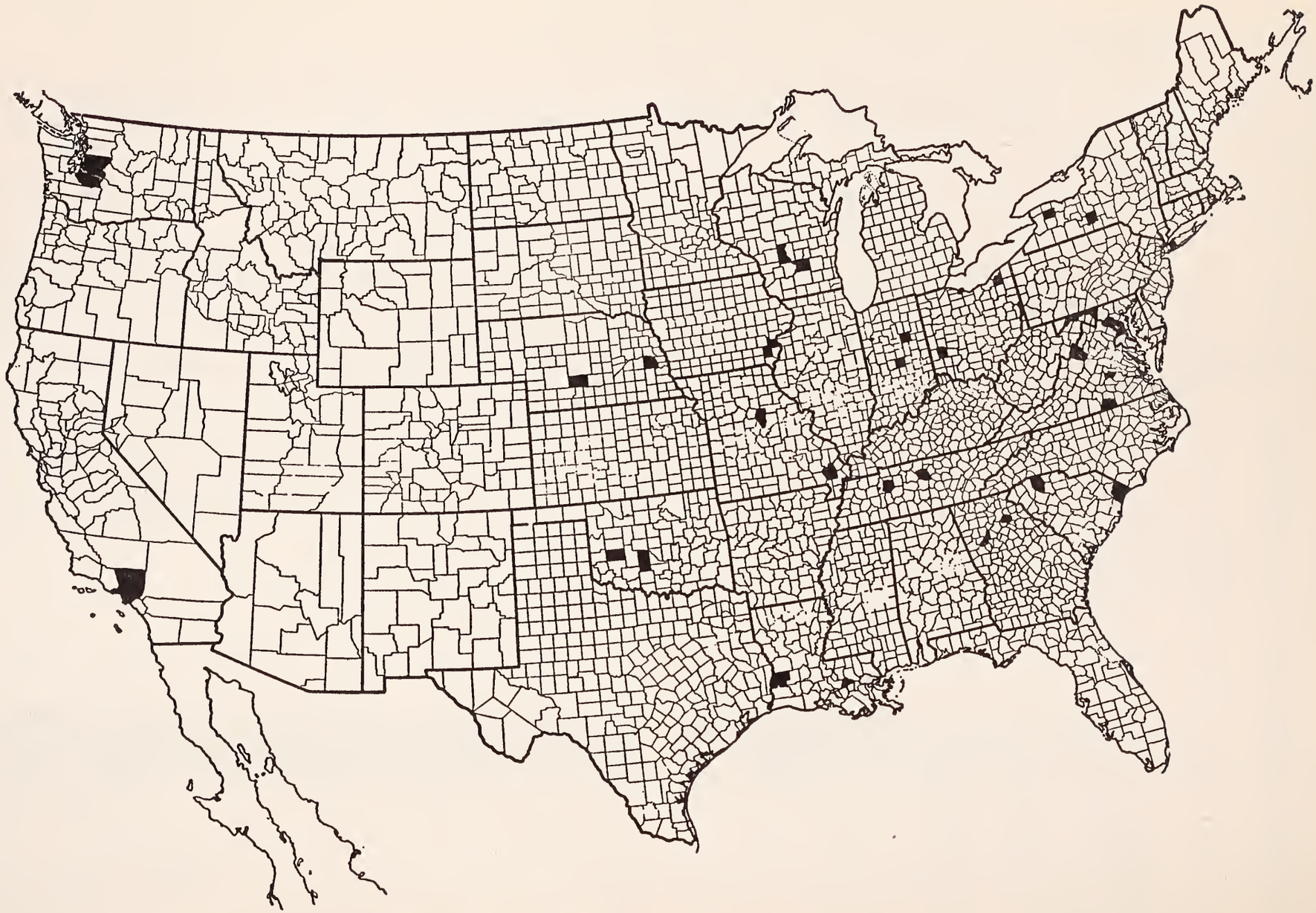
[3] Does not include money value of donated food.

[4] All or part of ingredients donated by United States Department of Agriculture or others and not included in the expense for food.

[5] Preparation time not shown for food transported from another school.

[6] Figures in parentheses not included in total.

APPENDIX B. LOCATION OF SCHOOLS



Map showing counties in which the school lunch studies were made

APPENDIX C. SAMPLE SCHEDULE

Sample

U. S. DEPARTMENT OF AGRICULTURE
Bureau of Human Nutrition and Home Economics

FN 1039
B.B.—40-R-1857

SCHEDULE FOR SCHOOL LUNCH MANAGEMENT STUDIES

Date October 13, 1947

School Elementary School No. 16
Location

THE LUNCH:

a	b		c	d		
Foods served	Size of serving		Paid by pupils	Quantities and cost of all ingredients in the Type A lunch (if donated give source)		
	Primary	Upper		Ingredients	Amount used	Cost (dol.)
Lima beans, dried	½ cup	½ cup		Beans	14 lb	0.179/lb
				Salt	5½ tbsp	.044/lb.
				Fat back	4 lb	.230/lb.
Turnip greens, canned.	½ cup	½ cup		Turnip greens	8 No. 10 cans	.500/can
				Fat back	3 lb	.230/lb.
Harvard beets, canned.	2 slices	2 slices	$0.16 for complete Type A lunch	Beets	3 No. 10 cans	.560/can
				Sugar	6 cups	.091/lb.
				Flour	1½ cups	.088/lb.
				Salt	8 tsp	.044/lb.
				Vinegar	5 cups	.512/gal.
				Margarine	2 cups	.300/lb.
Corn bread	1 piece 2½ by 2½ in.	1 piece 2½ by 2½ in.		Corn meal	12 lb	.060/lb.
				Flour	2 qt	.088/lb.
				Baking powder	1 cup	.105/lb.
				Soda	2 tbsp	.041/12 oz.
				Salt	6 tbsp	.044/lb.
				Buttermilk	1½ gal	.140/qt.
				Nonfat dry milk	4½ cups	U.S.D.A.
Baked apples	1 med	1 med		Apples	1 bu	2.000/bu.
				Margarine	1¼ lb	.300/lb.
				Sugar	7½ lb	.091/lb.
				Cinnamon	1 tsp	.075/4 oz.
Milk, whole	½ pint	½ pint		Milk	191 bottles	.055/½ pt.

e. Paid by adults for Type A lunch $0.24.

f. Number of pupils served per minute at peak 10

g. Reimbursement $0.08 per lunch.

School Elementary School No. 16

PARTICIPATION IN THE LUNCH:

1. Enrollment of school: 268

2. Number of lunches served:

	a		b		c		d	
	Type A		Type ____		Type ____		Type ____	
	Paying	Non-paying	Paying	Non-paying	Paying	Non-paying	Paying	Non-paying
Pupils	188*	4						
Teachers	9	0						
Workers	0	3						
Other adults	1	0						
Total lunches	198	7						

* Includes 18 pupils from nearby high school.

3. Home packed lunches brought by pupils:

a. Number 11.

b. Where eaten In lunchroom or on school grounds.

c. Number buying milk None.

School Elementary School No. 16

ACCEPTABILITY OF FOODS SERVED IN THE TYPE A LUNCH:

a	b	c	d	e
Foods	Appearance	Flavor	Number leaving	Weight of food left
Lima beans, dried	Very good	Very good (well seasoned)	17	3 lb. 6 oz.
Turnip greens, canned	Good	Fair (bitter)	28	4 lb. 8 oz.
Harvard beets, canned	Good (sauce a little thin)	Very good	22	2 lb. 8 oz.
Corn bread	Good (one pan overcooked)	Good (little dry)	32	3 lb.
Baked apples	Very good	Very good	17	3 lb. 5 oz.
Milk, fresh whole	Very good	Very good	4	1 lb. 13 oz.
Total				18 lb. 8 oz.

School Elementary School No. 16

THE WORKERS AND THEIR DUTIES (manager, cook, other paid adults, volunteer adults, paid pupils, volunteer pupils).

a	b	c	d	e
Workers	Hours worked	Wages	Training and experience	Job duties
Cook-manager	8:00 to 2:30	$21.00 per week and lunches.	Housewife, 4th year at this school; manager for 2 years.	Plans menus for week ahead; does most of the buying (principal does some buying). Posts all bills (principal keeps records and pays bills). Works along with 2 assistants in preparation, cooking, serving, cleaning, washing dishes, etc.
Assistant	8:00 to 2:30	$18.00 per week and lunches.	Housewife, 3rd year at this school.	Preparation, cooking, serving, cleaning of kitchen and dining room, and dishwashing.
Assistant	8:00 to 2:30	$18.00 per week and lunches.	Housewife, 1st year at this school.	Preparation, cooking, serving, cleaning of kitchen and dining room, and dishwashing.
Pupil (boy)	10 min	Lunch		Brings in coal.
Janitor	10 min	Paid from school funds		Builds all fires, cleans range.

School Elementary School No. 16

FLOW OF WORK (time expended by individual workers on each operation, including use of power equipment and capacity utilized).

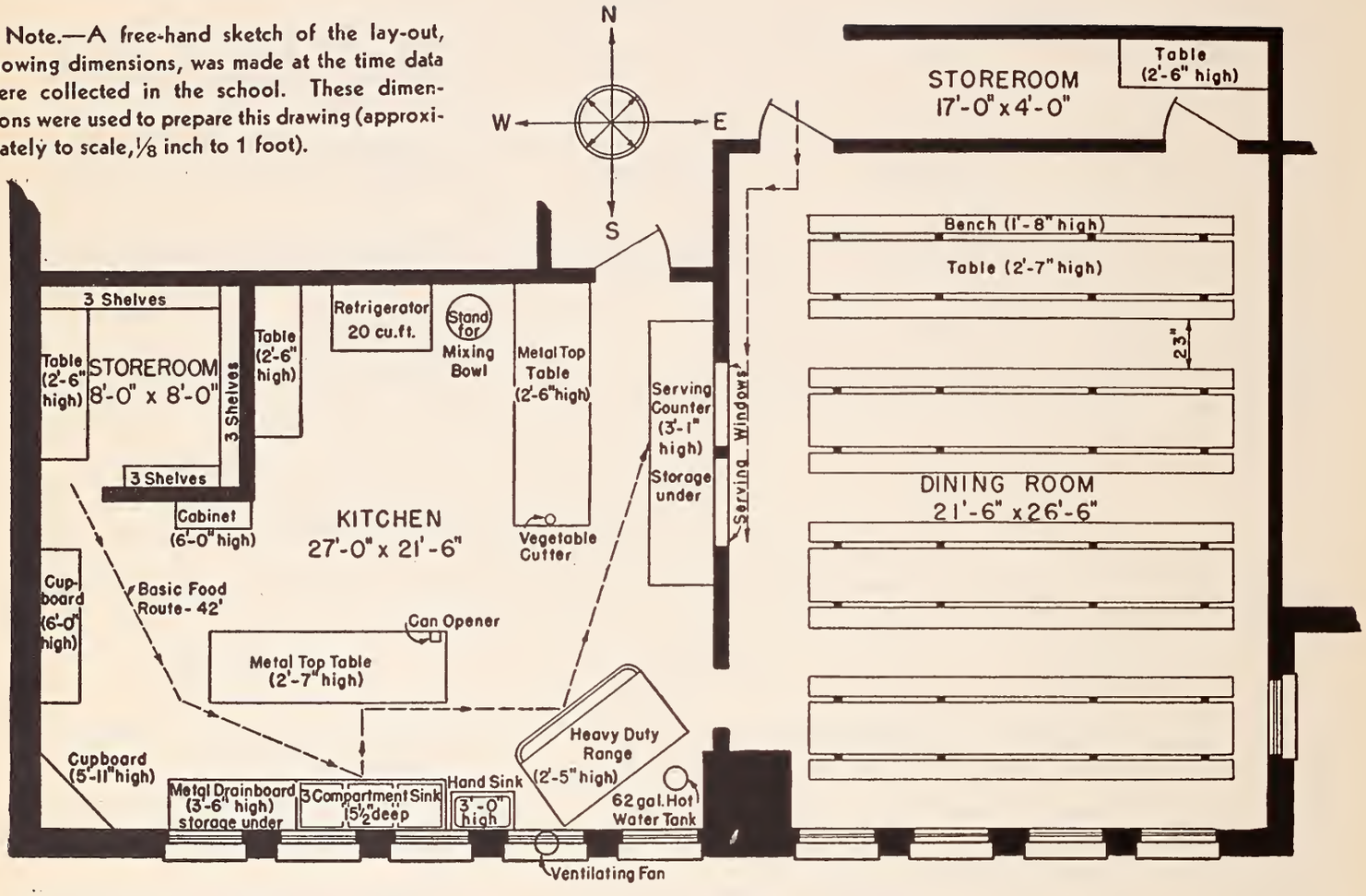
Cook-manager	First assistant	Second assistant
8:00–8:20. Opened packages of lima beans; washed beans.	8:00–8:09. Washed beans.	8:00–8:34. Washed beans; sorted and put into large pot on stove.
8:20–8:26. To storeroom in basement for more apples.	8:09–8:20. Hand cored apples.	8:34–8:37. Put apples in baking pans.
8:26–8:31. Washed apples and greased baking pans.	8:20–8:26. To storeroom in basement for more apples.	8:37–8:44. Put sugar in apples (2 pans).
8:31–8:40. Checked with district supervisor on menus, etc.	8:26–8:45. Hand cored apples.	8:44–9:01. Put apples in baking pans; put sugar in apples (2 more pans). Checked on 1st pan in oven.
8:40–8:47. Put margarine and cinnamon in apples. Put 1st pan in oven.	8:45–8:47. Sorted and washed apples.	9:01–9:05. Cleaned off table after preparing apples.
8:47–8:52. Put margarine and cinnamon in apples. Put 2nd pan in oven.	8:47–9:00. Hand cored apples.	9:05–9:22. Got out 2 dishpans for mixing corn bread; opened corn meal; sifted with hand sifter.
8:52–9:00. Put margarine in 3rd pan of apples.	9:00–9:04. Cleaned up apple cores and put them in garbage.	9:22–9:30. Got out baking powder and other ingredients for corn bread. Measured into 2 dishpans.
9:00–9:06. Stirred beans, put in more water.	9:04–9:07. Got out 8 No. 10 cans of turnip greens from storeroom.	9:30–9:33. Mixed one pan of ingredients for corn bread.
9:06–9:08. Put margarine in 4th pan of apples.	9:07–9:10. Got out 3 No. 10 cans of beets from storeroom; opened cans.	
9:08–9:10. Took 1st pan of apples from oven; put 3rd pan in oven.	9:10–9:25. Measured ingredients (sugar, vinegar, etc.) for sauce for beets.	
	9:25–9:30. Put sauce on stove; stirred.	

School Elementary School No. 16

LAY-OUT OF SPACE AND EQUIPMENT

(sketch showing kitchen, storeroom, and dining room with dimensions).

Note.—A free-hand sketch of the lay-out, showing dimensions, was made at the time data were collected in the school. These dimensions were used to prepare this drawing (approximately to scale, 1/8 inch to 1 foot).



School Elementary School No. 16

G. FINANCIAL RECORD FOR 3 MONTHS OR LONGER PERIOD:

1. Dates for period covered September 1946 through May 1947

2. Number of days lunchroom operated during this period 173

3. Number served:

	Paid	Free	Total
	Number	*Number*	*Number*
a. Type A lunches to pupils	36,040	649	36,689
b. Type A lunches to adults	3,155	0	3,155
c. Other lunches to pupils	0	0	0
d. Other lunches to adults	0	0	0
e. Milk only	0	0	0

4. Cash receipts:

a. Lunches	$ 4,982.09
b. Ice cream	$ (not sold)
c. Candy and knickknacks	$ (not sold)
d. Federal payments	$ 3,522.86
Total	$ 8,504.95

5. Expenditures:

a. Food	$ 5,220.47
b. Labor	$ 2,526.00
c. Repairs and replacements	$ 422.59
d. Other	$ 145.69
Total operating cost	$ 8,314.75

6. Contributions $ 182.50

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